The Builder.

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Ancient Cornish Sepulchral Monuments.

BORLASE is an auspicious name in connexion with Cornish antiquities, and the present possessor of that name, who now comes before the public with an essay on the ancient doctor's favourite theme,* seems to be well imbued with his antiquarian spirit. He appears, however, to be rather too much of a theorist or generaliser on the short-date principle, and follows in the wake of Mr. Fergusson, whom he outdoes, we think, in his attachment to that principle, and overlooks peculiarities, such as that of the wide prevalence of the simulative tomb order, which Mr. Fergusson has already clearly recognised and established.

We are far from insinuating that Mr. Borlase is consciously a theorist; we rather think he sub-consciously holds that it is the long-date people only who theorise, and that he alone, and those of his order, stick to bare facts. What we think, however, is that he generalises too far and too fast upon his facts, even as regards those ancient monumental records which he has carefully selected from the mass as being clearly sepulchral,—and, shall we say, late. With no other than the sepulchral will he deal; and in and about many of those he has selected were found urns and coins, of ancient Roman times. Secondary interments he almost discards, as they do not suit his foregone conclusion; but it is quite obvious that in ancient times, when the inhabitants of Cornwall knew well the purpose of burial-mounds and other sepulchral monuments, and how they were made, and what they contained, they may have frequently reared a fine monument and dedicated it to the remains and the memory of some great chief of their own time and tribe, by simply basing their new monument upon some already accumulated mound or other monument, especially if it were of ancient and immemorial date; and having dug right down at once to the kist in the heart of it, with comparatively little trouble, there buried the remains and the coins and urns, carefully replacing and restoring the monument so as to cause it to look like a span new one. Under such possible, — nay, probable, — circumstances, we think Mr. Borlase generalises, we repeat, too far and too fast when he forthwith concludes that *because* coins of known date have been found in earthen mounds and cairns, or in subterranean artificial or other caves, far less in kists or dolmens, and other monuments connected with ancient hut or cave dwellings; *therefore* the Romano-British occupation is, generally speaking, *the* proved and undoubted date, or a little earlier or a little later, of all such monuments, or of the general run of them.

Still there cannot be a doubt that there are many monuments in Cornwall dating from the close of the Pagan era, after the opening of the Christian, and while the Cornish were still Pagans; and Mr. Borlase gives a very interesting account of these and others, with numerous engravings,—of urns especially, the dates of which, however, in many cases, cannot be established like those of the coins.

In ignoring the immense antiquity of the Pagan era itself, which even a single flint implement of the drift establishes, some antiquaries wilfully close their eyes to the great probability that some at least of evidently the most permanent and most ancient of the monuments may have been more or less nearly contemporaneous with these implements, since many of these monuments,—to the dolmens we here specially refer,—are admitted, even by Mr. Fergusson himself, to be coterminous with the caves of the *arctic* or glacial cave-men; and it is a curious fact that even artificial caves, subterranean, and often beneath the remains of ancient surface hut dwellings, are a peculiarity of the Cornish as well as of other pre-historic monuments. Of some of these Mr. Borlase gives interesting particulars; and, as to both the beehive or other shaped huts, and the caves, as summer and winter residences, respectively, of the ancient Cornish Pagans, speaks of "the ruinous heaps of what were once the dwellings of a large resident population."

"To the cultivation of grain [he adds] *the mildness of the climate* [*in the summers*] was favourable; and thus in close proximity to these hut villages, it is usual to find plots of ground, artificially levelled, and cleared of stones. The daily consumption was taken from the unthrashed corn, preserved in *caves under the huts*, which also served as refuges for the inhabitants *when the winter was* SEVERE, or danger threatened."

And here we cannot refrain from quoting a passage from *Dark Blue* for January, 1873, which has turned up in our stray reading, as it refers to just such a state of things as must have at one time existed in Cornwall, much as it now or still exists in Kamskatka, and other nearly Arctic latitudes. It is the Rev. J. G. Wood who writes:—

"Every one who has watched the squirrel in its wild state knows perfectly well that it has two distinct dwellings, one for the summer and the other for the winter. The summer 'cage,' as it is called in the New Forest, where squirrels abound, is slight, pervious to the air, and placed at the end of a lofty bough; while the winter cage is a large mass of dry leaves, moss, and grass, fixed at the junction of a large branch with the trunk of the tree, so that when the inhabitant is within, it cannot be disturbed even by a breath of air, though a violent gale may be blowing. Now there are several parts of the world where men build dwellings of a similar character, light and airy for summer, close and massive for winter. Such, for example, is the habitation of the Kamskatkan, the summer dwelling being a slight structure of branches supported on a sort of scaffold, while the winter house, or 'jurt,' is deeply sunk in the ground, built of stones or large timber, and thickly and warmly thatched. The winter huts of the Tschutski, at the north-east of Asia, are constructed after a similar fashion, the roofs looking like low hillocks surrounded with stones. The ancients as well as the moderns had similar huts, the 'Ganggrabben,' or Passage *Graves* (?) of Scandinavia, so familiar to all ethnologists, being constructed on precisely the same principle as that employed in the Kamskatkan 'jurt.'"

We cannot even be regarded as going out of our way in here noting,—in reference to the fact that in Cornwall, as in Persia and elsewhere, in very ancient times, yet during man's existence in this and other countries, the winters *were* "severe," to an extent far greater than they now are,—that a remarkable mythical allusion to such a state of things in now temperate or warm parallels of latitude is made in the "Zend-Avesta" of Zoroaster and the ancient Persians, or Assyrians and Chaldeans. That allusion has allegorical or mythical reference, by contrast, to the loss of the "delights" or ecstasies of Eden or *Paradise*, and the culmination of the principle of evil in a terrible *winter*, just as in a *deluge*, in kindred documents, of recent interest, such as those of the Chaldeans and Assyrians of the region now called Persia. This is what the "Zend-Avesta" says:*—Ormuz, the God-Light, the good principle, informs Zoroaster that He gave to man a place [or state] of delight [or ecstasy] and abundance:—

"If I had not given him this place of delight, no other being would have given it him. This place is Eiren Vedjo, which, *in the beginning*, was more beautiful *than the whole world*, which exists by my power. Nothing equalled the beauty of this *place of delight* which I gave him. I [Ormus, or the Good Principle] acted first; then Petiâre [the Evil Principle]. This Petiâre Ahriman, full of death, made in the River the great Adder, *Mother of Winter* [the spiral apparent movement of the sun out of and into the hemisphere, *causing winter*, of more or less severity, according to the extent of the spiral, would figuratively accord with this mythical or allegorical *Serpent*, or Adder of Evil], given by the Dewa [or Evil Principle]. *The winter spread abroad*, cold, into the water, the earth, and the trees. *The Winter* [*this Great 'Winter' of the 'Deluge,'* when, according to Milton, who seems to have adopted this view in his 'Paradise Lost,'—

'The poles of earth were turn'd askance
From the sun's axle,'—

and the winter] *was extremely severe*, ABOUT THE MIDDLE OF IT. It is not until after winter has passed that good things are reproduced in abundance."*

In order to show how Mr. Borlase deals with his extensive subject in this suggestive and interesting volume, we shall now select several passages showing his more general treatment of it, always with passing reference to Cornwall, in relation to definitions of sepulchral monuments, and ancient modes of disposing of the body in burial. He says:—

Sir John Lubbock has summed up the characteristic features of the primitive sepulchre in the remark: "A complete burial-place may be described as a dolmen, covered by a tumulus, and surrounded by a stone circle. Often, however, we have only the tumulus, sometimes only the dolmen, and sometimes only the circle." To this list if there be added "sometimes only two adjacent menhirs, and sometimes only the simple standing stone," under the one or the other head may be classed every mode of interment hitherto discovered in Cornwall.

Firstly, the dolmen, or cromlech.

So much has been surmised and written on the probable derivation of this word, that the subject is only here introduced for the sake of recording the fact that, whatever it may signify,† it was in use as a local name in Cornwall, as well as in Wales or Ireland. "Rescal Cromlegh" represents, in an ancient deed, one of the boundaries of the property belonging to the Deanery of St. Buryan; a tract of country, even at the present day, more full of megalithic remains than perhaps any other of the like extent in the duchy. Unfortunately, the spot cannot be now identified, where this Cromlech—if, indeed, it was one, in the usual sense of the term—stood.

European Cromlechs are capable of division into three classes. 1. The dolmen, or "table-stone" proper, where, as Colonel Forbes Leslie remarks, "the vertical supporters of the tabular stone are columnar," and cannot be said to *enclose* a space. 2. The Larger Kist Vaen, or stone-chest, where, as the name implies, "the vertical supports are slabs;" and, together with the

* Nænia Cornubiæ: a descriptive Essay, illustrative of the Sepulchres and Funereal Customs of the Early Inhabitants of the County of Cornwall. By William Copeland Borlase, B.A., F.S.A. London: Longmans, Green, Reader & Dyer. 1872.

* See Depuis "On the Origin of all Religions."

* We here incline to identify this great secular Winter with a great secular Deluge: the one no literal or ordinary winter, and the other no mere local and passing deluge of days or months; because, comparing the Scriptural and other accounts of the Deluge after the alleged exit or expulsion of man from Eden or Paradise, with this Zoroastrian "Winter" after essentially the same allegorical or mythical event, it seems obvious that the one coincides with the other; and both, therefore, *may* really relate, mythically or allegorically, to the glacial era, during which great part at least of the northern hemisphere of the earth *was* flooded, or covered by the ocean, as well as subject to more than Arctic extremes of winter and summer. Thus, too, and thus only, geology and Scripture might be re-harmonised in respect to a "Deluge," and thus a light would be shed upon the meaning of the serpent as symbolical of an evil principle, as well as, *per contra*, of a good. (See leading articles in the *Builder* of the 16th and 23rd March, 1872, on "Megaliths and Tumuli: their probable Eras, 'Architects,' and Purposes.")

† After all, the most appropriate and satisfactory derivation of "Cromlech" seems to be found in the Irish "*crom*," Welsh "*crwm*,"="bent," hence "inclined over" (whence the Gaelic cromadh—a roof or vault, and M. Bullet's "ce qui enferme, ce qui couvre;"), and lech, "a stone." In slight confirmation of this idea (which seems much more probable than that it means a "circle"), take a line from the Cornish "Origo Mundi" (2443), where this same word "*crom*" appears as an epithet for rafters, the word being "brâs ha crom y ben goles"—"large and rounded (or vaulted) its lower side." The word would thus apply, like that of "Quoit," to the "covering stone" only, and not to the whole monument.

covering stone, form a structure not unlike what children build with five cards. These were designed to hold the interment within the chamber, and were covered, sometimes very slightly, with conical or other mounds. 3. Monuments, similar in structure to the last, but raised *over* the interment. These were merely cenotaphs, such as are frequently found in modern churchyards, not intended to contain the body, but to mark the spot, where the less pretentious grave was concealed below. Craig-Madden, in Stirlingshire, and many of the rude Irish cromlechs, are instances of this latter class; as well as the more prominent examples in Denmark and Norway, and at Saulcieres, in France, where the kists actually occur on the *summits* of the tumuli. No instances of this latter class are extant in Cornwall.

Of these three classes (and many subdivisions of them might be made, for each individual monument has some distinguishing characteristic of its own), the first, or "Dolmen proper," is comparatively of rare occurrence. In height it much exceeds the others, and the difficulty of its construction must have been proportionately greater. Three of the finest specimens of this class of cromlech are to be found respectively at Pentre Ifan, in Pembrokeshire; Castle Wellan, in Ireland; and Lanyon, in Cornwall. Caerwynen, in the latter county, is another instance of the same mode of construction, and the ruder trilithons of the Continent seem to belong to a like category. The form of these monuments in itself precludes the idea of the interment having taken place immediately beneath the covering stone, or of a tumulus having been raised over them; for, had such been the case, the *débris* of the mound must inevitably have forced its way at once into the chamber, the very result which, it is known, the builders of the kists were so careful to guard against. Dr. Wilson, therefore, regards monuments of this kind as "the true cromlechs," not in themselves subterranean chambers, but memorial structures raised over the grave. Such was the design in the case of one at least of these,—that at Lanyon, in the parish of Madron, the finest and, in all probability, the most primitive of our Cornish prehistoric remains.

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It may be as well to make a short classification of the various kinds of tumuli which are to be met with in Cornwall.

"The raising of mounds of earth or stone, over the remains of the dead, is a practice," says Mr. Akerman, "which may be traced in all countries to the remotest times." Dr. Wilson adds, that "their origin is to be sought for in the little heap of earth displaced by interment, which still to thousands suffices as the most touching memorial of the dead." It will be superfluous, therefore, to call to mind the individual instances of this practice which history supplies, or to dwell on the memorials which the conjugal affection of Semiramis, or the vast riches of Crœsus, the friendship of Alexander, or the stern obedience of Joshua to the will of the Deity, raised to the honour or dishonour of the noted dead. From times so remote one might, indeed, pass to European examples of much more recent date, and relate how Sigurd Ring, in the eighth century, buried his vanquished uncle in a tumulus after the battle of Braavalla, or how Queen Thyra and King Gorm, in the middle of the tenth century, were interred in a similar manner at Jellinge. Coming nearer home, Mr. Petrie might be quoted for the record of many an ancient Irish chieftain's burial mound; and, lastly, to make the chain perfect down to the present day, one might turn to the American Indians for a similarity in their customs of mound-building, which, when compared with those of ancient Europe, is certainly most remarkable.

We may here intercalate an interesting passage from a recent article by the Pekin Correspondent of the *Daily News*, on Chinese burial-mounds, which will aid in the completion of the "chain" to which Mr. Borlase here alludes. The correspondent is describing a visit to the Ming Tombs; and after speaking of "a long approach, bordered on each side with sculptured animals," —griffins, elephants, camels, horses, mules, and human figures,—he says,—

"This stone population of man and beasts extends for at least a good half mile, and ends by another triple gate. When you arrive at the end of the sculptured avenue just described, you are in the centre of an amphitheatre of hills, some three or four miles wide. One can see in the distance what seems to be country houses surrounded by trees all round the base of the hills. These are the tombs called Shih-san Ling, or 'thirteen tombs,' which is their number. It would have been impossible to have visited the whole of them, and, as they are all of the same type, we made for the principal one; and a slight description of it will do for them all. Their arrangement is very important as bearing on the old ideas of tomb construction, and particularly that of the barrow or tumulus graves. The graves all round Pekin are simply small mounds of earth, which are to be seen in every direction, and the Imperial tombs of the Mings are also mounds, but large mounds. We visited the tomb of Yung-lo, the third of the race, who died in 1425. A large mound, about 600 ft. or 700 ft. in diameter, forms the sepulchral part of this monument. It is surrounded by a high, crenellated wall of brick, and planted with trees, the pine, with its resinous scent, being most plentiful. The mound is thus made to appear like a strong castle or fort, and it would be taken for something of that kind were it not that it is almost entirely hidden by a series of very important buildings erected in front of it. These buildings are surrounded by a wall forming a long enclosure in front, the whole being about 1,200 ft. long by 500 ft. wide. The buildings within this enclosure are in the form of a palace or temple, with gates and halls and altars, showing that in this part of the world, the tomb, the temple, and the house, are constructed on the same idea. The principal hall is over 200 ft. in length, and is supported by teak pillars, sixteen of which are of great height (about 60 ft.), and nearly 4 ft. in diameter at the base. They are said to have come from Borneo, and were made into a raft, and brought by that means. In this hall there is a shrine, with a tablet in it to the memory of Yung-lo."

Suffice it (continues Mr. Borlase), for the present, to say, that as far as Cornwall is concerned, not a single record or available tradition, as to the origin of these mounds, has been handed down to us; although by hundreds they lie scattered through the length and breadth of the country; on the summit of almost every hill, along the edges of the cliffs; wherever, in short, a barren tract of country has afforded them protection from the plough.

In the West the word "burrow" (the more correct pronunciation of the usual term barrow) is applied as well to the refuse heap from the mine, as to the sepulchral mound of more ancient date. In this latter sense it has taken the place of the Celtic "cruc," or vulgarly "creeg," the genuine Cornish word for a hillock or mound, still found among others in the following local names: "Creegcarrow"—Deer's barrow; "Creeglaso"—Green barrow; "Cruk heyth"—Barrow-heath; Crig-an-bargus—"Kite's barrow;" and "Creggo" (plural), "The Barrows." The later Saxon word occurs in Hensburrow, Four-Burrow, &c.

The ancient burrows are sometimes piles of earth, sometimes accumulations of stones. In the latter case they are termed "cairns," or by the Cornish, "Karns." Those tumuli, on the other hand, which are composed of earth and stones indiscriminately thrown together, are seldom or never found to be sepulchral in their origin, but have been raised for a beacon, or occasionally for a hermitage to be perched on their summits. It must be mentioned, however, that in the centre of an earthen barrow, a "cairn" of loose stones is very frequently found. In one instance, where this arrangement had taken place (a most promising barrow on the Carnecledgy Downs, near the Nine Maidens, St. Columb), no interment could be discovered, though the mound was clearly undisturbed by previous explorers.

In spite of Dr. Wilson's opinion to the contrary, as regards Scotland, it may be laid down as a general rule in the case of Cornish "burrows," that those formed of earth belong to districts where stone is not readily obtained, while the "cairns" are the natural product of a stony district. Thus, to the St. Colomb, St. Austell, and Lizard districts, the earthen barrows belong; while "cairns" are invariably found on the granite hills of Dartmoor; at Sharpy Tor, near Liskeard; as well as throughout the entire range of West Cornwall.

By far the greater number of Cornish tumuli, whether cairns or barrows of earth, were surrounded by circles of stones set on their edge, not peristaliths or rings of rude pillars apart from the mound, like that at New Grange, but circular base-works or walling; the stones being generally contiguous, and serving both to confine the earth or stones within their proper area, and to support the superstructure of the tumulus. . . .

The sepulchral mounds of Cornwall, whether of earth or stones, range from 15 ft. to 100 ft. in diameter, and from 2 ft. to 25 ft. in height. As it has been usual to classify them according to their form, the reader may learn that he will find in Cornwall—first, the Cone-shaped barrow; second, the Bowl-barrow; third, the Bell-barrow; fourth, the Flat-barrow; and, fifth, the Ring-barrow; a class which may perhaps, with equal propriety, be called the Unfinished barrow.

"Long barrows," "Druid barrows," "Egg barrows," "Twin barrows" (i.e., two surrounded by the same trench), are unknown.

* * * *

The different modes of disposing of the body, which meet the explorers of the early sarcophagi of Great Britain, are three in number. Interments have either been placed in the ground *whole*, or they have been reduced to ashes by (1) *cremation*. Those bodies which have been buried in their entirety are either (2) *extended* or (3) *contracted*. It may be remarked with reference to the practice of inhumation, that throughout the North of England it is by far the most common mode of burial; and that in England generally the contracted form of it has been found to have prevailed very largely. Thus, the Rev. Canon Greenwell, in a letter dated the 12th of December, 1871, informs the author that "out of above 200 interments of what may be considered pre-Roman times," he has only found "a single instance where the body had been buried in an extended position." So much for the north. Coming further south, the combined researches of Sir R. C. Hoare and Mr. Thomas Bateman, tabulated by Sir John Lubbock, show that out of some 500 interments explored with care, only thirty-seven were extended, while 112 were contracted, the rest being burnt.

In Cornwall a marked difference is observable. Well-authenticated instances of inhumation at all are extremely rare. Among these only two or three examples of the extended position actually occur; but the not-uncommon occurrence of empty long graves, whether cut in the hard soil or walled with stones, affords a strong presumption that, had they not been rifled, a similar mode of interment might have been discovered in them. Of the contracted position, only one really authentic instance can be cited.

[The Southern origin,—probably African, as we showed in our articles of March last, already alluded to,—of many of the Cornish aborigines inadvertently comes out in Mr. Borlase's further remarks on cremation.]

The necessity, as he says, for such a course must have almost immediately forced itself upon the denizens of a sultry or tropical climate, where, to bury the bodies in shallow graves unburnt, would only be to spread pestilence far and near.

"That the custom of cremation originated in a tropical clime is, indeed almost beyond a doubt. In South America* the funeral pile is quite as fully recognised as a national institution among native tribes, as ever it is in India. Britain has, therefore, received it from the south."

These references, we may add, go to show that cremation came in with the African, or, at least, the Southern, aborigines, and inhumation with the Asian or Eastern migrants of the Northern region, through the great plain of Europe, while probably a mixed practice came with the South-eastern migration through Persia or Assyria and Asia Minor.

The contracted form of the body in inhumation, resembling the sleeping posture of the Thibetans, appears to have been very general in ancient times, since it prevailed even in America, and Herodotus speaks of its adoption in North Africa.

* Dr. Daniel Wilson, "Prehistoric Man," vol. ii., p. 291, makes the following curious remark:—"Mummification, cremation, urn-burial, and inhumation, were all in use among different tribes and nations of South America, and have left their traces no less unmistakably on the northern continent."

A CHAT ABOUT GATEWAYS AND PORCHES.

THE idea which an English boy, and thus generally an English man, forms of a gate, is something very different from that which was conveyed by the word before the period of the Great Fire of London. The definition of a gate, as ordinarily conceived, would be an openwork barrier, constructed of wood or of metal, and made to swing upon hinges, the general object being the exclusion of stray cattle, and the ready admission of human beings, and of animals under the care of man. The most exhilarating associations connected with the word are those which attach to the five-barred gate;—visions of hound and horn, of red coats and gallant mounts, of a bright autumnal morning and a free gallop over a grassy country.

Indeed, of the 750,000 persons who enter the city of London every twenty-four hours, we question if there are seventy-five who bestow even the most fleeting thought on the original meaning of those names,—Aldgate, Bishopsgate, Ludgate, Newgate,—that designate the streets

through which they so frequently pass. But in ancient London these names had a serious significancy. The form still kept up, on certain occasions, of demanding permission from the Lord Mayor for the Sovereign to enter the City, which has subsided into the simulated presentation of ancient keys at Temple-bar, to be returned with a customary compliment, is a lingering trace of that armed vigilance which, in the days of such ready-handed monarchs as the Conqueror, formed the surest safeguard of the cradle of English freedom. The instance which we have cited is almost the only relic left among us of the ceremonies which formally attached to the guardianship of the City gates.

The inhabitants of York, of Chester, of Arundel, and of some few other of our ancient English towns, may yet retain some feeling of pride in their gates. We need not, even now, leave the shore of England, in order to form an adequate idea of what were once the main features of this important member of our municipal defences. A massive tower, or a pair of towers, joined by a curtain, perforated by a wide and lofty arch, closed at nightfall, or in case of alarm, by ponderous iron-studded leaves of oak, with, probably, a yet stronger grating of wood or iron, that could be lowered from its ambush above, to fall without the City gates; such was the general outline of the structure. A turret, or watch-tower, with a stone stair leading into the vestibule, or arched court forming the central area of the gateway, through which all who used the road must pass, was also usual. Here, in fact, were united the elements of security and of accessibility. There was the outlook post to give warning of danger; the free access for traffic at proper times; and the strength which could resist any hostile attack that fell short of a regular siege.

In the East, the gates of a city were the scene, not only of all extraordinary ceremonials, but of the ordinary administration of justice. Our ancient courts of *pied-poudre* were held at times under trees; but the giving of Oriental judgments is so associated with the city gates that the three treatises of the Talmud that contain the civil laws of the Jews are entitled the first, the middle, and the last Gate. One of the most interesting relics of the architecture of the thirteenth century in Italy is the arched court, entirely open at the sides, in which Charles of Anjou sat, in summary jurisdiction, in his quaint little cathedral city of Sorrento. In this archiepiscopal orange-garden the changes that took place in the form of gate, as war improved the means of offence, are well illustrated. There is first the arch between two towers, flanked by loopholes for archery. Then there is the more complicated structure, approached by a bridge, with curtain to turn the incomer from the direct line, and with chambers from which arquebus-men or even culverins could sweep the path. The double tower was abandoned when gunpowder became common, because the fire from one flanking projection would damage its twin-neighbour; an effect not to be feared from the arrow-flight. Then comes the stately Spanish gateway, a return to something like the Roman arch. And a little within the city the justiciary function of the gateway is performed by a separate building.

Lofty gateways, with battlemented walls and stately towers, blazoned with the sixty-six quarterings of the Imperial House of Austria, tell of foreign rule in Italy. In such gates may be seen the evidence of a state of society when surprise was not dreaded; but when well-established military power, relying on arms and discipline, felt it unnecessary to diminish the pomp of the city entrances for the purpose of defence. We may mention, as connected with massive architecture telling of a power that once bid fair to be the dictator of Europe, an example of that shelter for the applicants for admission, which in Gothic architecture (and in the rural architecture of our own country) has given birth to the porch. Over the great gateway of an ancient palace in Naples, now devoted to the administration of what the Neapolitans ironically term justice, is a large expanded hood, of the most delicately-wrought stonework, reaching out from the wall without prop or support, and entirely sheltering the steps. This stone hood looks almost as fragile as a shell; yet it has existed for centuries, in spite of the earthquakes which compel the partial reconstruction of most buildings in that city at least once in a century.

In ecclesiastical architecture the porch forms a feature of the utmost importance. The principal entrances to large and beautiful churches may be classed in three groups. First, there is what we may call the tunnel mouth; a form of gate or of window in which there is little or no projection beyond the plane of the walls, but where a series of mouldings die away, as it were, into the shadow of the great opening for access or for light. The Porte de Hal, at Brussels, a work of the fourteenth century, furnishes a good illustration of this receding gateway. The west front of Tewkesbury Abbey Church affords a noble example of receding mouldings under a large semicircular arch. The splay, so common in Early English lights, is a kindred feature, although its purpose of admitting the largest quantity of light with the smallest actual perforation in the wall, leads to the reversal of the funnel, the splay being within instead of without. This method of dealing with a doorway, which is mostly to be found in our earlier forms of Mediæval architecture, may be considered as naturally derived from the excavation of rock for structural purposes.

A second form of gateway, being that which has probably attained the highest splendour, is that in which the central façade of a building constitutes a great portico; appearing sometimes even as a separate structure. Something of this kind must have characterised the Temple of Solomon, in which both the height and the width of the porch were greatly in excess of those of the main building, the height being double, and the width nearly one-third greater. Instances of this great façade, often pierced for three gateways, are preserved by some of our English cathedrals with which our readers are familiar.

But the porch proper, as we generally understand the term, differs from either of the above main types of architectural gateway. It is, in its essence and origin, an open and roofed space before the gate, in which the visitors may be protected from the weather while waiting for admission. It is thus a characteristic of a northern country, and springs from the employment of wood for structural purposes. The rustic porch, shaded by ivy, and bordered by the hardy flowers which our forefathers had to cultivate, was the very spot for a calm enjoyment of the long twilights of midsummer. There was a daily convenience in the porch, a real *raison d'être*, which gave an unusual permanence to its use as an architectural feature. To this day it is solemnly reproduced in the dismal stuccoed doorways of our cheap metropolitan houses. Absurd as the two columns, with brick cores and cement casing, supporting a small projecting square, that sometimes, though rarely, is utilised as the floor of a greenhouse are; yet the advantage gained by shelter from the downpour which we may expect for 200 days out of the 365, is such as to enable this often unsightly addition to our doorways steadily to hold its own.

So natural to a northern country is the porch, so readily do its simple requirements lend themselves to the exigencies of every style of Gothic architecture, that the repetition of the idea, within as well as without the building, has become one of the main features of ecclesiastical decoration. Wherever the image of saint or angel was erected on the outside of a building, the shelter of a special porch became obviously proper. This, in fact, is the canopy. Thus it came to pass that, for large statues within or without a building, unless in some instances of special position and dignity, the bracket-stand and the tabernacle canopy became the natural setting. For the stalls of canons and other dignitaries, in abbeys and cathedrals, the general idea of the niche with its sheltering canopy, was developed in the richly-carved choir; the throne of the bishop, or the stall of the abbot, prior, or dean, towering up into a pinnacle expressive of superior dignity. With wooden canopies in the choir, and with stone canopies within and without the walls, was combined yet a third rendering of the original idea of the porch. In the lights of stained windows, where saints or benefactors were portrayed at full length, they were treated like statues, and thus the tabernacle work, which exercised the skill of the carver, was simulated by the worker in glass. While the delicacy of the tracery that was originally intended to admit light, but to exclude weather, forms a main part of the glory of some of our noblest churches (as, for instance, the cathedral of Gloucester), the niche, with its elements of shady recess, of projecting and often foliated bracket, and of tabernacled canopy, is, perhaps, the source of the most abundant architectural decoration of all our pointed work.

There is another form of gateway, admirably adapted for the comfortable domestic life of the easier classes of society, which is so rare in this country that it is not easy to call attention to a well-known and perfect type. On the Continent, especially in Italy, it is of constant occurrence, under the name of the *portone* or *porte cochère*. It is a feature generally conspicuous by its absence in many of our large palatial buildings, in which it ought to form at once a striking architectural feature and a most desirable luxury. To be forced to alight, in evening dress, at the verge of a pedimented portico, in stepping across which wind, and rain, and sleet have a momentary chance of assailing the defenceless visitor, of which they rarely fail to make vigorous use, is, in point of fact, a barbarism. A convenient gateway, leading through the centre of the house to the court-yard around, or in front of, which it stands; with the principal flight of steps leading down, under cover, so that you step from the carriage direct into the vestibule, is an arrangement never lost sight of in Italian palazzi. It is almost a necessity for health (at least for protection from dangerous cold, precisely when the person is least fitted to resist it), no less than for real comfort. The contrast between our metropolitan palaces and those of even a second and third rank in Italy is here extreme. In attending a levee at either St. James's or Buckingham Palace, the silk-clad calves are keenly sensitive to the sharp nip of the March winds. At Caserta, at Naples, at any one of the numerous and noble palaces which adorn the Italian kingdom, those who arrive to pay their duty to the sovereign, step from the very door of their carriages into a carpeted saloon, with the utmost indifference to the state of the weather without.

In some of our public buildings, as at Covent Garden Theatre and the Albert Hall, there is, indeed, the convenience of a large carriage-porch, projecting from the face of the building, which gives a certain degree of shelter to the visitors; but these porches are only rude expedients. In old Saxon times horses and carriages were admitted into the main hall. There is a rude magnificence in this arrangement, which is hardly consistent with our present ideas.* But in rough winter nights, and such is the season which the architect ought chiefly to bear in view, the wind almost invariably sweeps through a projecting carriage-porch with concentrated fury. Direct downpour is averted, and that is almost all. Between the rough barbaric state which admits the champion on horseback into the capacious hall built by William Rufus, and the makeshift shelter of a shed before the door, the simple, commodious, dignified arrangement of the *portone* comes in. It is the only true mode of entrance to a palace or great public building.

Port, portico, and *portone*, while they are variants of the same original word, have thus come by this time to express very different architectural ideas. The root of the word is probably derived from the opening through which burdens were borne, or ported, into a fortified place. The monosyllable is now unused by us, except in a nautical sense, and in such compound words as sally-port and port-hole. In each of these we have an instance of the smallest and least-conspicuous aperture that will allow of the issue of troops, or of the projection of the muzzle of a gun. With our recent improvements in defence, especially with reference to our use of solid planks of iron for the walls of forts and the bulwarks of ships, the port becomes more narrow, so as to be almost invisible from any serious distance, as well as more efficiently strengthened against shot. The ports and gates of all regular fortifications are concealed, as far as practicable, behind an earthen *glacis*, so as to be out of range of the enemy's fire. The architecture of modern war thus abhors the picturesque, and presents a remarkable contrast to the proud castellated keeps of the Middle Ages.

Thus the word port may be taken as associated with that tunnel-formed mouth of which we have before spoken. The portico, both in language and in fact, is the forerunner of the Gothic porch. Whether projecting before the main building, as in the National Gallery and University College, or flush with the façade, as in the paired columns of St. Paul's, the portico is properly a protection against the

* The Saxon hall, modified so as to consist with the extreme of modern luxury, has been reproduced in Stanmore Hall, the residence of Mr. Robert Holland, at Stanmore, Middlesex.

sun—a roofed gallery or promenade, in which the air may be enjoyed by those who linger without the temple, while sunstroke may be averted. This peristyle contrasts admirably with the Gothic cloister, a characteristic example, of which is to be seen at Westminster. The purpose of the cloister is to give shelter from foul weather, as that of the peristyle is to give shade from the sun. They are two parallel developments of a structure originally wooden, one fitted for a southern climate, and the other for our own.

Connected with the various forms of porch, we may mention a subject that has now lost its ancient significance, namely, the mode of hanging the doors. We know from classic history that the distinction between the doors of a house and those of a temple, namely, that the former opened inwards and the latter outwards, was one which it was unlawful to neglect. In many of our country churches we find the doors open outwards into the porch, as all doors should do through which a crowd may have to escape.

There is one innovation which is very rapidly deteriorating our domestic architecture in the matter of doors and windows. We allude to the practice of leaving out the shutters. We fear that this trumpery economy is becoming universal. Street-doors, moreover, are now often pierced for panes of glass, to which no shutter is attached. Shutters are becoming the exception, instead of the rule. The quiet and the gloom, in which all persons sleep best, and without which some nervous temperaments, or hard-worked brains, can obtain no refreshing sleep whatever, are thus sacrificed, to save a few pounds in the construction of a house! It is, in fact, a step in the return to the original wigwam. The number of steps that we have thus taken, and are taking, back towards barbarism is such as to be anything but consolatory, if fairly set forth. Perhaps no blow of equal force has ever been so quietly dealt to that repose which is a necessary element of perfect health, as in the case of this miserable and wasteful bit of parsimony. In Italy, where the great influence of those mighty builders, the Romans, is yet paramount, the shutters of windows and the leaves of doors are such as to shame our trumpery make-shifts. Lofty apertures adorn every building but the very poorest, closed with three-fold care. Without is a strong wooden framework, containing louvre-boards, or what we call Venetian blinds, which admit air when desirable, and a small degree of light. Within this is a substantial pair of glass doors. Within these, again, are shutters, that are at once thief-proof and light-proof. The contrast between the well-appointed windows of an Italian palazzo and the cheap bits of flimsy glazing of which the visitor to London by the Great Western Railway may look out upon such daily-extending acres, is as striking as that between the stuccoed porch and the handsome commodious *portone*. Truly, we may take many a lesson in domestic architecture from the contemporary buildings of Italy.

CARRIAGES AND THEIR WAYS.

IT is scarcely possible to take up a daily newspaper without observing the frightful number of catastrophes which may be classified roughly under the head of "carriage accidents." Putting mere collisions,—the results of unskilful driving for the most part,—restive horses, and so forth, out of the question, we shall soon begin to discover that most of these casualties are owing, in the first place, either to defects in the construction of the carriage and the harness; and secondly, to glaring constructive defects in the roadway over which the carriage is driven. Carriage accidents are of course no modern contingency; only the days are somewhat altered since coaches and six, of the original style and model of the Lord Mayor's state-coach and that of the Speaker of the House of Commons, drew leisurely along that suburb of the city of London which existed from Charing-cross to Temple Bar. The conditions of society have likewise altered, and so have the character of the carriages. The extension of their use is also quite enormous. Indeed, it is a sort of necessity of modern life that it shall be more or less *vehicular* in its action of locomotion, and it is hardly necessary to add that speed is the highest quality sought after. From the neat, trim, and tidy brougham of the professional man or the City merchant, all through the innumerable categories, to the splendid chariots and sociable landaus of the "upper ten" which glitter and sparkle athwart the long equestrian vistas of Piccadilly and the Park, the one thing conspicuous, the predominant feature in fact, of the whole of them, is that lightness, airiness, and, it is proper to add, elegance of build, which are alone compatible with a high degree of speed. Hence it follows of course that the entire frame-work, as well as the wheels and springs, are reduced to the very minimum of constructive strength. Any part is liable to rupture at any moment. We have seen a patent spring broken over and over again by having simply undergone the process of rapid driving across a hundred yards of newly macadamised road. We have also frequently seen a stylish pole snap near its socket from the simple but obvious cause of the checked inertia of a too sudden pull-up by a fashionable whip. In almost all cases the wheels are possessed of much too narrow tires. Those new-fangled drags, with the long poles and silver swivels, drawn by a pair of high-stepping blood horses, which seem to realise the ideal *currus triumphalis* of our horsey aristocracy, are decidedly unsafe instruments of transit or conveyance. Everything about them is too slender or too slight. The tires of the wheels seem to be gradually approaching those of the velocipide, *i.e.*, only about $\frac{3}{4}$ in. in breadth! and are turned moreover on the outer section to the arc of a very small circle. No doubt, there are precedents for such a model machine. The Louisiana "buggy," with which type they seem to be associated in their construction, has some excuse for slender wheels and narrow tires, inasmuch as it is primarily destined to the purposes of travelling through the half-liquid Missouri mud or the dusty land of the looking-glass prairie which alternately constitute the superficies of the roadways in the neighbourhood of St. Louis or Chicago. There, however, what must be acknowledged at once to be a certain fitness of things, or rather adaptation to purpose, is clearly a piece of blundering imitation and impertinence in Hyde Park or Hounslow Heath. And let us mark the consequences when these attenuated wheels get into the rut of a tram-way rail!—by no means a remote contingency. It is all very well so long as they are *in* the rut; the getting out again is the difficulty,—like the getting out of all other ruts in this unhappy world! Let the shrill whistle be heard and the ugly car be seen approaching: it is well if the fashionable Jehu,—who must turn out at all hazards by Act of Parliament, and turn out too at an angle more or less acute and disadvantageous,—it is well, we say, if there be an escape with only a broken spring or two; and if the whole unsubstantial and airy fabric, with its too confiding occupants, are not relentlessly smashed up at the shrine of this modern Juggernaut! It needs no stretch of imagination to shadow forth such a fatal occurrence.

The tramways, indeed, with respect to private carriages, have very nearly destroyed the superficial safety of our leading roadways. No good coachman will, if he can possibly avoid it, traverse these dangerous thoroughfares. They have cruelly invaded, if not altogether destroyed, the ancient and time-honoured law of the road; and although we must confess a dislike to all manner of pessimists and prophets of evil, we cannot avoid in this case entertaining the strong impression that tramways, as at present constructed and governed, and managed, will prove a perennial source of fatal accidents of the most painful and revolting character. In fact, they have already done so in every large town in the kingdom where they have penetrated. The method their projectors have introduced, of laying down a solid bed of Portland cement concrete roadway, in the centre of a Macadamised road, or even in a street of granite cubes, cannot do otherwise than produce, in course of time, the most serious surface inequalities. It will also be easily understood that the more substantial and solid the construction of the tramway, the worse these inequalities will soon appear in its junction with the roadway. And this is nothing, moreover, to what we may expect to see when the subway has to be taken up for repairs or renewal of rails, or, still worse, to get at the water or gas pipes, or sewers or telegraphs, which are buried beneath their obdurate surface. The effect of a sudden change of temperature,—such as a severe frost following upon a long tract of wet weather,—is too often neglected. The contraction and expansion of the iron rod,—often imperfectly welded,—which forms the tire creates a looseness of the entire circle of wood and iron, which is more prolific of accidents than most carriage people are aware of.

With regard to the defective harness of our fashionable carriages, we have more to say than we can at present find room for. That, too, seems to be suffering more and more from this ill-omened process of tapering off and attenuation. The breech harness seems to have in some cases disappeared altogether. The traces, also, are gradually growing small by degrees and beautifully less. We are given to understand that the modern *improvement* of sewing harness by machinery is gaining ground in the manufacture, and those who understand the value of such seams in woollen or linen cloth, where no such enormous tensile strain has to be encountered, will, perhaps, pause and investigate before they trust their lives to a bran new set of "splendid silver-mounted harness." As to those wretched Birmingham plated buckles, which too often disgrace our modern equipages, the wonder is that they do not more frequently give way at the joints than they actually do. These buckles, we ought to point out, are more dangerous, of course, on account of their smaller size, upon the reins than the traces. It has to be mentioned, moreover, that from whatever cause,—a defect in the process of tanning, it may be, or the employment of inferior skins,—our modern harness is by no means so strong in the fibre as it was, say, five-and-twenty years ago. The breaking, or rather tearing weight, of a modern ribbon of leather, is not nearly so great as that of an ancient one of similar dimensions. The consequences are that, with diminished scantlings on the one hand and deteriorated strength of fibre on the other, the most common of carriage accidents in our days arises from a rein breaking or a trace giving way. It was only the other day we observed, with more than ordinary feelings of regret, a fatal accident of this kind which occurred near Cockermouth. A gentleman was driving his wife out, when the horse, a young and spirited animal (imperfectly bitted, in all probability), took fright and ran away. As the road was long and level, there was not much ground for apprehension to a skilful driver, as there unquestionably was in this case; *but the reins broke.* The horse took a too sudden turning at a narrow bridge, with the parapet of which it came into violent contact, and was killed on the spot. The vehicle was smashed to pieces. The gentleman who was driving escaped with a broken limb; but his unfortunate partner in this life was launched into eternity! We may add, in conclusion, that many an accident on the hunting-field is unquestionably due to a defective stirrup-leather or a broken rein; and we cannot too earnestly insist on their security. Indeed, we hope to see the day when all such important and, in the interests of the public health and safety, vital articles of commerce as carriage-harness and springs, together with their wheels and axletrees, will be subjected, along with iron girders and steam-boilers, glycerine and gunpowder, petroleum and inflammable oils, to the crucial test of a Government stamp and supervision.

THE RATING OF MINERAL PROPERTY.*

IN considering the question of the rating of mineral property, the poor-rate is the most important, and generally when the poor-rate is payable most of the other parochial rates are payable also. The Poor Law of the present day takes its origin and is now based upon an Act of Parliament passed in the reign of Elizabeth; and under and by virtue of that Act a tax was imposed upon every inhabitant, parson, vicar, and every occupier of lands, houses, tithes, coal-mines, or saleable underwood, within the parish, for and towards the necessary relief of the lame, impotent, old, blind, and such others being poor and not able to work, within the said parish. It will be seen that no mine except a coal-mine was by that Act rateable to the poor, although, as Lord Ellenborough has observed, the word "coal-mine" was probably mentioned in the statute by way of example and not of exclusion, and notwithstanding a more recent opinion of Chief Justice Tindall that if the statute were now to be reviewed it would be probably held not to exclude any mine. But, whether by accident or intention, the law remains the same to the present time,—viz., that no mine, except a coal-mine, is liable to the poor-rate.

When a mine is not liable to be rated, the

* From a paper on Mines and Minerals, by Mr Arundel Rogers, read at a meeting of the Institution of Surveyors.

proprietors will not be liable to a rate for engines, machinery, buildings, or any other erections, erected and used solely for the purpose of effectually working the mines, either on or beneath the surface, or for drawing water from off the mine, such erections being regarded as part and parcel of the mine; but all smelting-mills, furnaces, machinery, and buildings necessary for smelting or the like purposes, are not regarded as part and parcel of the mine, and are therefore rateable, although the mine itself may not be rateable.

It frequently happens that iron is intermixed with coal, and in such cases it was formerly doubted whether the entire productions of the mine, including the iron as well as the coal, was not rateable; but it was afterwards decided that the lessees and occupiers of a large tract of land, and of mines which had been discovered under the said land, containing iron and coal intermixed, were not liable to be rated to the poor in one sum for the farm and land, and in another sum for the iron and coals, although sufficient coal only was raised for the purpose of manufacturing the iron, and not for sale,—the Court holding that the lessees and occupiers were not rateable for the iron, but only for the coal, and that, inasmuch as they had been rated for both the iron and coal in one entire sum, the rate being bad as to one was bad as to both; for the Court had no means of ascertaining how much was applicable to one, and how much to the other.

But although mines, except coal-mines, are exempt from poor-rates, under and by virtue of the statute of Elizabeth, minerals are not always exempted, and, consequently, if minerals be raised in any other way than by means of a mine, they will be liable to the rate. Minerals frequently are raised from quarries; quarries of minerals are, therefore, rateable; and, as the question has often been raised whether the working for ores, or the raising of metallic and even non-metallic substances amounts to a mine or a quarry, it will be seen that the attempt we have already made to draw a distinction between the two is not unimportant.

Tolls or dues reserved in kind, in respect of all mines, are also rateable, on the ground that the reservation is a portion of the land itself, and that the persons entitled to them are the actual occupiers of the land; but tolls or dues reserved in money are not rateable to the poor, because such a reservation is a certain fixed payment or rent reserved out of the produce of the land, not amounting to a reservation or an occupancy of the land itself. On this subject, Mr. Justice Taunton, many years ago, is reported to have said, "The distinction is very subtle, but the cases may, perhaps, be reconciled by distinguishing between a reservation of a rent and a reservation of part of the soil; in the latter case the lessor has been considered as occupying that part of the soil which he has so reserved. Here there is a pecuniary rent reserved and no reservation of any part of the soil. A reservation of a portion of the ore in a melted state is in the nature of a money reservation, and therefore not rateable; if in a state only fit to be smelted it is like a reservation of part of the soil, and consequently rateable."

Tolls or dues payable by custom, as in the case of tin-bounding, are subject to the rate, and residence is not necessary to create the liability to pay the rate, whether the reservation is by custom or by deed.

The principle upon which coal-mines are rated is contained in the Parochial Assessment Act, 6 and 7 Wm, IV. c. 96, which provides that every rate shall be made upon an estimate of the net annual value of the several hereditaments rated, —that is to say, of the rent at which the same might reasonably be expected to let from year to year, free from all usual tenant's rates and taxes, and tithe commutation rent-charge (if any), and deducting therefrom the probable average annual cost of the repairs, insurance, and other expenses (if any) necessary to maintain the property in a state to command such rent. The Act also provides that nothing therein contained is to be construed to alter or affect the principles or different relative liabilities (if any), according to which different kinds of hereditaments were then by law rateable.

The Union Assessment Committee Act, 1862, provides that the gross estimated rental shall be the rent at which the hereditaments might be expected to let from year to year, free from all usual tenant's rates and taxes, and tithe commutation rent-charge, and that nothing in that Act contained was to repeal or interfere with the provision of the before-mentioned Parochial Assessment Act, which defined the net annual value of the hereditaments to be rated. The Union Assessment Committee Act, 1862, further provides that nothing therein contained was to affect any special or exceptional principle of valuation.

The provisions in the two before-mentioned statutes are not necessarily inconsistent; and if the principle involved in them had been more closely followed, we should have been spared many inconsistencies in the valuation of mines, for the purpose of rating, which have occurred among the different assessment committees.

A coal-mine must, therefore, be rated, and as soon as it is set to work and produces coal, and only during the time that it is productive. Lord Ellenborough illustrated this principle, by observing that the mine itself being exhausted, the subject-matter of profit is gone, and that being rateable only for the concurrent annual value, during the period for which the rate is made,—if the mine be occupied no longer,—no longer affords any such concurrent annual value,—the subject-matter of the rating is gone.

It also follows from the before-mentioned Acts, that the criterion of value does not necessarily depend upon the actual amount of rent paid to the landlord, but on the sum for which the land or entire property would reasonably let. Consequently, the improved annual value from year to year of the mine, together with the machinery, buildings, and other erections, whether underground or on the surface, and without considering whether the machinery be real or personal property passing to the heir or executor, or belonging, at the expiration of the lease, to the landlord, lessee, or tenant, must be included in the valuation.

No person can be rated in respect of a right of way, of way-leaves, wagon-way, or similar incorporeal rights, because they are in their nature incapable of occupation; but a rate may be made for such rights, in respect of land in the actual and exclusive occupation of such persons in or over which such rights are exercised; and if, therefore, the same person is in possession of the land and of the easement, he will be subject to the rate. The rules which are adopted in rating railways will be generally the best guide in rating all other rights of ways.

The highway-rate extends only to those mines and quarries of stone which had usually been rated to the poor-rate, and are made payable by the occupier. And by 14 & 15 Vict., c. 16, special provisions are made respecting highways, situated in the counties of Glamorgan, Brecknock, Radnor, Carmarthen, Pembroke, and Cardigan; and by the 23 & 24 Vict., c. 68, it is provided that the highway-rate shall be levied on the persons and in respect of the property by law rateable to the relief of the poor in the respective parishes, and shall be assessed upon the net annual value of such property ascertained by the rate, for the time being, for the relief of the poor, provided that the rate shall also extend to such woods, mines, and quarries of stone as were before the Act of 5 & 6 Wm., c. 4, usually rated to the highways.

Mines and quarries are liable to *church-rates*, not as distinct from the land, but as part of the land, and there should be no separate assessment, unless the ownership to the minerals is distinct from the ownership of the soil.

Mines, however, are not usually *titheable*, except by prescription or custom; but minerals or anything else which is part of the soil, as a brick-kiln or salt-works, may be subject to the payment of tithes; as, for instance, in the parish of Wirksworth, in Derbyshire, where the lead-mines are subject to tithes by custom. By the statute for the commutation of tithes into rent-charges, the term "tithes" is defined to mean all prescriptive and customary payments, and special provisions are therein inserted for the commutation of minerals tithes, and whenever mines or minerals, subject to tithes, are commuted by the Act into rent-charges, the rent-charge is to be subject to all such Parliamentary, parochial, and county and other rates, charges, and assessments as the tithes were subject to before such commutation.

The rating of mines, ways, and easements in Ireland is provided for by the 1 & 2 Vict., c. 56, wherein it is declared that the following, among other hereditaments, shall be rateable under that Act, viz., all lands, buildings, *and open mines*; all commons and all rights of common; and all other profits to be had, received, or taken out of any land, rights of way, and other rights or easements over land, and the tolls levied in respect of such rights and easements, and all other tolls; provided always that no mines which have not been open seven years before the passing of this Act are to be rateable until the term of seven years from the time of opening thereof shall have expired, and no mines thereafter are to be rateable until seven years after the same shall have been opened, and mines *bonâ fide* re-opened after the same shall have been *bonâ fide* abandoned, are to be deemed an opening of mines within the meaning of the Act. The rates are to be estimated according to the same principle as that adopted for assessment in England.

The result of the law, as it now stands, may, therefore, be stated thus:—

1. Coal-mines only are rateable to the poor-rate; but machinery and buildings, not absolutely necessary for carrying on a mine, whether it be a coal or any other mineral mine, are rateable.

2. That the mine is rateable only during such time as it is productive.

3. That a mine which is partly coal and iron, or any other mineral, can only be rated in respect of the coal, and then only if the value of the coal can be separately ascertained.

4. That although every other mine except a coal-mine is exempted from rates, all minerals which are raised from quarries are rateable.

5. That tolls or dues payable in kind are rateable, whilst if payable in money they are not rateable.

6. That all way-leaves and other easements are exempted from rates, unless there be land occupied therewith.

7. That all other parochial rates and taxes, including tithes and church-rates, are only payable when the poor-rate is payable.

8. That in Ireland all mines of every description are rateable, but not until after they have been opened for the period of seven years.

Such being the state of the law at the present time, I desire the opinion of this Institution whether any and what alterations can be advantageously made. The subject has recently attracted the attention of the Legislature, and they will very soon again be engaged upon it. Is it reasonable that coal-mines only should be rated, and all other mines be exempted? or that all minerals, if raised by means of quarrying, should be rateable, but if raised from a mine, not rateable? And should (what I think may fairly be called technical) distinctions be allowed to prevail, whereby tolls or dues, reserved in kind, become rateable, whilst the value of such tolls or dues, if reserved in money, are not rateable?

HULL SOUTH AND WEST JUNCTION RAILWAY.

THE first Parliamentary battle of the session of 1872–73, in so far as private Bill legislation is concerned, came off on Monday last in the Court of Mr. Frere, Senior Examiner on Standing Orders. The case was that of the proposed railway to pass under the river Humber, at Hull.

Last year, before the joint Committee of Lords and Commons on railway amalgamation, influential men, more or less intimately connected with the North-Eastern Railway Company, gave evidence to the effect that the North-Eastern Company furnished, in so far as it went, conclusive evidence that in its case amalgamation had proved excellent policy on the part of the companies amalgamating, and without detriment to the public. The company paid amongst the highest dividends of any in the United Kingdom; the public was well served; and the witnesses had not heard of any complaints on the part of the public of defective or irregular service, or because of the amalgamation. A few months have furnished evidence somewhat in confutation of these statements. The merchants, traders, and inhabitants of Hull complain bitterly of their want of railway accommodation, and have determined to supply it for themselves, at a cost of about a million pounds sterling. They had initiated their important project before the amalgamation committee closed its sittings. Of late there has been in the neighbourhood of Hull a plethora of traffic, which the North-Eastern Company, it is alleged, has been unable to relieve. Laden trucks making up trains extending to miles in length have accumulated that the company has not had means of conveying to their respective destinations, and the parties interested have, as a matter of necessity, combined to help themselves, if haply they may. The proposed line

has excited very general and lively local interest, and commands very strong local support.

Certain allegations having been discussed and sworn to, the Examiner ruled that the general plan should, in every case, be made as complete as possible, and that, where there was room to write the numbers, they should have been entered on the general plan, as well as on the enlarged plan. An engineer was called on each side, and, as is not unusual in such cases, they flatly contradicted each other, one contending that nobody, and the other that anybody, could identify the particular properties from the plans as deposited.

On this finding the allegations of the memorial were, in many instances, sustained, and will be reported to the Committee on Standing Orders, who may probably give a dispensation. The ruling is not necessarily fatal to the Bill.

BOARDS OF ARBITRATION IN GERMANY.

A MEETING took place lately between the Association of Berlin Master Builders and the foremen of the Berlin building trades to deliberate upon the advisability of definitively constituting a board of arbitration for the building season of 1873. Boards of arbitration were originated, it is asserted, at Berlin, by Dr. Max Hirsch. The period for which the board of arbitration for the building trades had been provisionally constituted expired with the year 1872.

Director Simon, after explaining the object of the meeting, said it was desirable to have the opinion of the foremen on the subject, and also to ask them whether they would assist the masters in their endeavours.

Dr. Hilse then pictured the present anomalous conditions at the outbreak of disputes, and put it to the meeting whether they were willing to assist in obtaining the object in view.

A long debate ensued, in which it was pointed out by Dr. Hirsch, who had been specially invited by the Association, that all parties of social Democrats were now agreed as to the desirability of arbitration, and that the disputes as hitherto conducted were ruinous. The *Volksstaat* (organ of the workmen) had openly advocated boards of arbitration, and the Carpenters' Union had entered into communication with the Association respecting the laying down of a tariff for piecework. The speaker then entered minutely into the object of the Boards, directed attention to their beneficial activity in England, and requested the meeting to further the definitive constitution of such a Board for the Berlin builders. No opposition was raised in the meeting to the principle of arbitration. The only objections mooted were, that the awards of the Boards were not binding, and that the workmen ought to be consulted first. This latter view was ultimately adopted, and it was resolved to issue an address to the workmen. As soon as the views of the latter are known, the definitive formation of the Board is to be proceeded with. A conference of delegates of social democrats, as well as of the local unions of the building trades, is shortly to be convened.

THE LATE W. W. DEANE, ARTIST.

THE late William Wood Deane was born the 3rd of March, 1825, at Islington; received a classical education under Bishop Jackson, at the grammar school; and was articled to Mr. Herbert Williams, architect, on Sept. 7, 1842. On the 13th of January, 1844, he was admitted a student at the Royal Academy, and obtained a silver medal in December of the same year. He also became a student of the Royal Institute of British Architects, and obtained prizes there in 1844 and 1845. After serving his articles he assisted Mr. Mocatta, and obtained some premiums in competition.

He travelled in France, Germany, and Italy for two years, returned to England at the latter end of 1851, and took the late Alfred Bailey into partnership. During their partnership they built the Langham Chambers. After their separation, in 1855, Mr. Deane built some houses and studios, and put a new stone shop-front to Messrs. Dickinson's, the photographers, of Bond-street; but being averse to the business part of his profession, and being without clients, he mainly occupied himself with making designs and drawings and colouring views of new and proposed buildings for other architects, and in occasionally drawing on wood, for the illustrated papers. He eventually abandoned architecture for painting. He was elected Associate in 1862, and Member, in 1868, of the Institute of Painters in Water Colours, from which he migrated, in 1870, to the old Society. He also exhibited at the Dudley Gallery, and at the Royal Academy. He was attacked with disease of the liver in 1870, and died at his residence, 64, King Henry's-road, N.W., on the 18th inst.

It is rarely we have to deplore the loss of one equally skilled in architecture and painting, and one, too, cut off at the very height of his powers. It is too true that those only who were his personal intimates could appreciate those talents for architecture that were denied a fitting career. Had he possessed a fortune, or a patron, he might have embellished London with his works; for no man ever had a more fertile invention, a nicer feeling for proportion, a greater mastery over detail, nor a more cultivated appreciation of the scope and meaning of his art; but after a fruitless essay of ten years, he turned to painting, where no assistance but skill was required to get competence and fame.

All who are interested in the arts know his charming exposition of the architecture and landscape of Europe, from the slated houses of the old French towns, glistening with the rain, to the yellow spires of Seville, winking in the heat; from the sombre coolness of St. Mark to the brilliant whiteness of the Moorish towers of the Cornice. The loss of the man is even more deplored by those who knew him than the loss of the artist, for it was difficult to know whether one was more attracted by the fine points of his character or by the brilliancy of his conversation.

CHELSEA WATERWORKS.

CONSIDERABLE dissatisfaction has been caused by the proposed works of the Chelsea Waterworks Company, from the fear that their execution will detract from the picturesque beauty of certain localities near the banks of the Upper Thames. The present intake of water from the Thames, under the Act of 1852, is at Seething Wells, in the parish of Kingston, at which point the water is at times turbid and discoloured. It is proposed, by the Bill to be brought before Parliament in this session, to take water at a point above Moulsey Lock, in the parish of West Moulsey. The works will consist of an engine-house at West Moulsey; a reservoir, about 485 yards long and 20 acres area, at East Moulsey; a second reservoir, of nearly the same dimensions, in the parish of Thames Ditton; and a third on the east side of the existing reservoirs on Putney Heath; also six conduits or lines of pipes; a river-wall in the parishes of East Moulsey and Thames Ditton respectively, and on the right banks of the rivers Ember and Thames respectively. The estimated cost of the works is 220,000*l.*, and powers are proposed to occupy a period of ten years in their completion.

IMANUEL CHURCH, STREATHAM COMMON.

A REREDOS has lately been erected in this church, the principal material employed being Caen stone. The central portion of the composition over the altar is raised higher than the rest and is crowned with an enriched cornice, surmounted by a species of delicate cresting. The central panel is composed of a quatrefoil richly moulded, inclosing a white alabaster Maltese cross; a representation of a dove, holding an olive-branch in its beak, occupies the intersection; the background is formed of gold mosaic. The side-panels are composed of cusped circles, with the ears of wheat and the vine inlaid with marble on an alabaster ground. Between these panels come rich hollow mouldings, containing the passion-flower and the lily, bordered by bands of dove marble. At the side of the altar is an arcade of seven bays, with shafts of dove marble. The sill of the east window not being very high, part of the design is carried up between the jambs of the window and the wall. There are three gabled panels on each side, the spandrels carved with flowing foliage, and the copings crowned by sculptured finials. As the east window is composed of stained glass of deep shades, the reredos, as respects *colour*, has been kept rather subdued, dove marble and mottled alabaster being the main *tinted* materials. Some ornamental gratings under the reredos have been picked out in colour by Mr. C. Hudson, of London. The total cost of the work has amounted to about 200*l.*, the whole of which has been defrayed by Mr. William Leaf, of Streatham Common. Mr. Ferrey, F.S.A. (who designed the church), supplied the designs and working drawings; and Mr. J. L. Jaquet, of Westminster, executed the reredos.

MINSTERLEY, SHROPSHIRE.

THE fine old manor-house has been lately restored by the Marquis of Bath. The timber framing exposed to view, on the removal of the plaster which covered the exterior, has been replaced with new oak where the old was decayed, and 9-in. brickwork, plastered, has been used for the filling in, thereby adding considerably to the comfort of the occupiers of the house. Windows, with oak frames, mullions, and transoms have been substituted for plain sashes where the latter had been inserted, and the moulded barge-boards, hip knobs, and brackets are reproductions of the old, which were decayed. The west, or principal front, consists of three wide and lofty gables, with a lower and richer one at the north side running through to the east front, and probably of earlier date. On the east or garden front the two large dormers, of which the valley pieces indicated their size and position, have been restored. The roofs have been covered with Ridgehill tiles. Internally, the panelling has been continued round the hall, and the screen opened out. Mr. Haycock, of Shrewsbury, was the architect; and the contractors were the Messrs. Bowdler & Darlington.

A vicarage has been built for this parish, principally at the expense of the Marquis of Bath, who also gave the site, and of the Ecclesiastical Commissioners, who made a liberal grant. It consists of drawing-room, dining-room, study, kitchen, &c., and six bedrooms, and is built of red brick, relieved with bands of white and black. Yellow Grinshill stone has been used for the heads, mullions, and sills to the windows. The roof is tiled. The work has been carried out by Messrs. Bowdler & Darlington, under the direction of Mr. Edward Haycock, at a cost of about 1,100*l.*

FROM IRELAND.

Belfast.—The foundation-stone of the Ormeau-road new Wesleyan chapel school was laid in April last, and the building, having been pushed forward with much vigour, was opened on the 12th inst. It is situated at the corner of Ormeau-road and McClure-street, and the style adopted is Lombardic, of a simple character. The floor of the chapel is raised above the level of the Ormeau-road by the introduction of a wide flight of steps, necessitated by the ground on which the building is erected. Underneath the chapel, having entrances from McClure-street, is the school-room, 53 ft. by 40 ft., and 12 ft. high, and in connexion with it are four class-rooms, each about 16 ft. by 10 ft., and a room for the heating apparatus and appliances for tea-meetings. The chapel is 58 ft. by 40 ft. on ground-floor, exclusive of vestibules, and has a fall of 9 in. from front towards rear, which gives an uninterrupted view of platform, and the pews are all open. Two wide sets of stairs from the outer vestibule give access to the gallery, which runs round three sides of the building, and is supported by columns. At the rear, and communicating with the chapel, are the vestry and committee-rooms, and over these commodious apartments for the care-taker. The whole of the chapel fittings are of selected pitch pine, slightly stained and varnished. The warming-apparatus consists of hot-water pipes, which run up the centre and round the sides of the chapel. The lower or basement-story is built of rubble masonry, pointed, the remainder being red brick, with white and blue brick dressings, the piers of the entrance-arches having cut-stone moulded bases, and carved caps and key-stones. Accommodation is provided for about 600 persons, and the cost will be about 2,500*l.*, including gas-fittings, heating-apparatus, boundary-wall, and so on. Mr. William Batt, jun., was the architect, the plans having been selected in competition; and the works have been executed by Messrs. Rowley & Mansell. The heating was done by Messrs. Riddell; and the plumbing by Mr. J. Gilroy. The gas-fittings were executed by Mr. W. J. Watson; and the entrance-gates by Messrs. Musgrave & Co., all of Belfast.

DEFECTS IN THE SANITARY PROVISIONS OF THE METROPOLITAN BUILDING ACT.

AT a meeting of the Social Science Association, on the 20th inst., a paper by Mr. John Liddle, Medical Officer of Health for the Whitechapel District, "On the Defects of the Sanitary Provisions of the Building Act, 18 & 19 Vict. c. 122, with Suggestions for their Amendment," was read and discussed; Lieut.-Col. Beresford, M.P., in the chair.

Mr. Liddle said: What I am anxious to do by bringing the subject of this paper under your notice, is to prevent the further erection of unhealthy houses; for unless the existing evil of permitting new houses to be built with a total disregard of such arrangements in the structure and surroundings of a dwelling-house as are necessary for healthy occupation be presented, all the labours of sanitary officers in getting unhealthy houses closed under the Nuisance Removal Acts, or pulled down under the Artizans' and Labourers' Dwellings Act, will be comparatively useless, if similarly unhealthy houses can be built elsewhere, or even, perhaps, on the old foundations of those which have been condemned. The rights of property are, as regards house buildings, unduly considered, while the rights of the public, as regards their breathing the pure atmosphere, are disregarded. The only property that a poor man generally possesses is his health—deprive him of that, and he, and perhaps his whole family, are at once rendered destitute. Such is the demand for houses at the present time among the poor that any place, however unhealthy it may be, will readily find a tenant.

The healthy housing of the population is the foundation of all sanitary improvements, for unless stringent laws are passed to prevent the erection of unhealthy dwellings, the numerous statutes relating to the public health will be of comparatively little benefit. The radical defect in the Building Act is, that it is not complete in itself, but other Acts of Parliament are incorporated with it; and hence an unnecessary amount of trouble is imposed upon builders in having to consult the district surveyor in some matters relating to the building of a house, and the Local Board in others, and no one authority seems to be responsible for seeing that a house is so constructed as to be fit for habitation.

Mr. Liddle, having enumerated what he considered the principal sanitary defects in the Building Act, submitted the following suggestions as amendments. A Building Act should, in the first place, provide:—

1. That no house in any new street shall be occupied as a dwelling-house unless a sewer has been constructed along such street, and a communication by a properly constructed and ventilated drain made from the house to the sewer. The ventilation of the house-drain, into which usually passes the soil-pipe of the water-closet, may, as I am informed by Mr. S. W. Iron, the surveyor to the Board of the Whitechapel District, be easily carried out by fixing a small pipe in the upper part of the soil-pipe, and carrying the same above the roof of the house.

2. That before any house is permitted to be occupied, the road and footways shall be paved, and the surface-drainage properly provided for.

3. That before the building of any new house is commenced, plans of the drainage and of all the sanitary arrangements of the house shall be submitted for approval to the Local Board. This Board shall be invested with power to compel the builder of any new house within the district so to alter his plans, if necessary, for the healthy occupation of the house, as the Board under the advice of its officers shall direct.

4. It shall likewise be made compulsory upon every builder to provide a separate water-closet or privy, and ash-pit, for each house within the curtilage of the house. This provision would prevent the erection of public privies in courts occupied by the poorer classes, which are now, for the most past, public nuisances, and injurious to the health of the people.

5. That during the progress of the building of any house, the surveyor to the Local Board shall be required to inspect the foundation thereof; and if such surveyor be of opinion that the materials which are being used for such foundation are not proper for the purpose, he shall make known his objections to the builder, and shall report the same to the Board. This report having been made, the Board shall have power to prevent the use of all such improper materials.

6. That the walls and foundation of every house shall be so constructed as to prevent the rise of damp.

7. That every new house shall at all times have at the rear an open space of sufficient extent for the thorough ventilation of the staircases and passages. The extent of the open space to be determined by the Act (say 100 square feet), but the plan of this open space shall be approved by the Local Board, before the builder is allowed to complete the building.

8. That the floors of every house shall be properly ventilated, and that the floors of the basement shall not be laid upon the bare ground.

9. That the back yards of every new house, and of the houses now in existence, shall not be built upon without the sanction of the Local Board; and in no instance shall the open space in the rear be less than 100 square feet, and so arranged with regard to the house as to be sufficient, in the opinion of the Local Board, for the purpose of ventilation.

10. That old buildings, such as warehouses, stables, &c., shall not be converted into dwelling-houses, unless the plans as regards all the sanitary arrangements shall have been submitted to, and approved of, by the Local Board.

11. That the same law as regards the width of new courts and alleys shall be applied to old courts, when any of the houses therein have been pulled down; for, if it be deemed necessary that new courts shall be, for purposes of health, of a certain width, it is equally necessary for the public health that the old courts should be equally wide.

12. In order that every new street shall have an adequate supply of sunlight, which is so essential to health, the buildings on either side of the street shall not be permitted to exceed in height the width of the street. This regulation would be of the utmost importance in courts which are not thoroughfares, but such is the desire of owners of property to make the most out of it (and unfortunately such a proceeding is sanctioned by the Legislature), that they are perfectly regardless of the rights of the public to breathe the pure air of heaven and enjoy the light of the sun.

13. That in consequence of danger to the public while walking along the streets by the falling of snow or slates from the roof of any house unprovided with a parapet-wall, no new house shall be considered as completed unless the same is provided with a parapet-wall.

14. That no house shall be allowed to be occupied unless there shall be a passage leading from the front-door to the back-yard; and unless the staircase leading to every room shall open into a landing, so that each room in every house shall be distinct and separate from the other rooms. Under present arrangements it is not uncommon to find that builders, on the score of economy, build houses with the front-door opening direct from the sitting-room, on the ground-floor, into the street, and the stairs leading to the upper rooms opening directly into and forming a part of the lower room, so that the foul air of the lower room is ventilated by means of the staircase into the room above. Such a faulty arrangement also destroys the privacy and comfort of families, by converting rooms so arranged into thoroughfares. There are some houses in the Whitechapel district in which the tenants of one room are obliged to carry all their filth through their neighbour's room before it can be thrown into the privy or drain in the back-yard. This proceeding is not only highly indecent, but, in case of epidemic diseases, is dangerous to health, the germs of such disease being frequently contained in and given off from the excrement of the sick.

15. That no house shall be permitted to be occupied, unless the person letting such house shall have a certificate, signed by the surveyor and medical officer of health to the Local Board, that the same is fit for healthy occupation, which certificate shall be shown to every incoming tenant.

16. That in consequence of numerous unhealthy houses, which are continually being built in the suburbs of London, and also in other large cities and towns, and the suburbs thereof, the area of the new Building Act shall be extended to all large towns and populous cities in England; and that the carrying out of all the sanitary arrangements of habitable buildings shall be intrusted to the Local Boards, who by their several officers would be able to superintend the erection of all houses.

17. That the Building Act shall contain a section to give power to the Local Board to purchase such property, at a moderate compensation, as has been condemned under the Artisans' and Labourers' Dwellings Act by the medical officer and surveyor to the Local Board.

18. That in all cases of dispute between the Local Board and the builder, in regard to plans of drainage and other sanitary provisions, power of appeal to a competent authority shall be given.

In conclusion, permit me respectfully to urge upon this Association the desirability of forming, with as little delay as possible, a deputation to the Local Government Board, and urging upon its notice the pressing necessity of the Government bringing in such a Bill as shall effectually prevent the further erection of unhealthy houses; for so long as houses unfit for habitation are allowed to be built, the labours of the sanitary officers will be comparatively of little avail, and the public will continue to suffer from many diseases which are preventible.

We shall return to the subject.

CONCRETE BUILDINGS.

SIR,—With reference to the history of concrete buildings, the following passage in an interesting work on "Santo Domingo and Haiti," by Samuel Hazard, just published, is deserving of notice. With reference to the buildings in St. Domingo city, it says:—"The walls of the older houses are very solidly constructed, either of stone or the material known as mamposteria, a mode of architecture somewhat similar to that of Cuba. The method of making these walls is simple and economical. The glutinous earth of the vicinity is taken and mixed with lime, and sometimes, as in Cuba, with powdered stone; frames of planks are then made in the desired form, and these are filled with layers of this composition, sand and lime being added. The whole is then moistened with water, well pounded and kneaded, and allowed to dry, when the mould being withdrawn, leaves a firm solid wall, which, on exposure to the air, becomes hard as stone. Even the walls of the city are built in this way."

I am told by an engineer who has visited those parts that the stone used is a description of lava.

T. A. BRITTON.

PERSPECTIVE DRAWING.

IN the course of a paper "On Architectural Perspective," read at the Architectural Association of Ireland, as mentioned in our last, Mr. J. L. Robinson said:—

It is a great error to be careless in the first instance with a perspective, and then bestow a great amount of work on the details. Get in the main lines correctly, and after some practice you will be enabled to fill in the details without rules by merely getting a few main points. Of course the portion nearest the eye should be drawn neatly, and with greater care than the background, which may be treated in a comparatively sketchy manner.

Architects, as a general rule, are too prone to confine themselves to geometrical drawings, which, though exceedingly useful and indispensable, are such that none but a professional mind can grasp, and that few of the uninitiated can understand. We all know who have tried the experiment how difficult, almost impossible, it is to impress a client with the slightest notion of what we mean by an elevation or plan. It is from a want of perspective knowledge not only with the profession, but with the public generally, that is mainly derived the odious custom of having the front of the detached or semi-detached suburban villas of red brick of the most ambitious design, whilst the flank and rear walls are simply dashed, or, still worse, compo'd down and "struck out to imitate stone." This generally arises from an elevation of the front being submitted to the client whilst the sides and back are allowed to shift for themselves. Both architect and employer forget that, when built, it can never possibly appear as on paper. If we cannot have the funds to build such houses of red brick all round, let us have all the walls of good stock bricks, well designed and of good outline, without wigging or shams of any kind; and I have no doubt but that the public would prefer them to the ridiculous mushrooms that are springing up round the city, whose appearance "cannot but make the judicious grieve."

An architect should, when making a geometrical drawing of no matter how trifling an object, have the perspective effect of it in his mind's eye, and he will never make a mistake, or be disappointed

when he sees his design put into execution. Some I have known who, when they are making a design, make a rough perspective sketch on the margin of the paper, to give themselves an idea of the effect, which I consider an excellent practice, and worthy of imitation.

There is no greater aid to the study of perspective than that of sketching from nature, or a close study of completed buildings. If the artist has a good eye and a steady hand, he will see how objects show in perspective, and will after a while be enabled to make perspective views untrammelled by any rules save those of good taste. What can be more agreeable to the architect or artist than to ramble about, sketch-book in hand, and sketch any object that strikes his fancy, and thus lay by a store of pleasant *souvenirs* or useful hints which he may have received on his travels? It is by such means that the mind is to be enlarged and experience gained.

I would now caution you against a fault which I would almost consider criminal,—namely, the deliberate falsification of perspective drawings which some indulge in, in order to give to their designs a better aspect than the working drawings give. This I consider,—and I know you will agree with me,—is a pernicious and dishonest habit, and likely to lead the men who are guilty of it to shame and exposure. It is mostly resorted to in getting up competition drawings. Others, when they introduce figures in the foreground of their dwellings, make them veritable pigmies, ranging from 2 ft. 6 in. to 4 ft. in height. This is done in order to make the building appear of far greater size than it actually is. The cheat is, however, soon detected by comparing the size of the doors and windows and other details with the figures.

And lastly, a word with regard to that not least important branch of the subject, the style of the drawings. Some architects draw them in pencil pure and simple, and I consider few drawings have a neater and better effect than a neatly-drawn pencil-sketch; others outline in pencil, Indian ink, or brown ink, and tint,—much can be done in this way by a clever colourist; and others etch in Indian ink, writing-ink, and brown ink. Etched drawings are very effective, are great favourites, and are open to a wonderful variety of treatment.

GLASS HOUSES AT MILNER FIELD, NEAR SALTAIRE.

AN extensive range of hot-houses has been recently erected at Milner Field, Yorkshire, the residence of Mr. Titus Salt. The garden is a new one—indeed, it is yet in course of formation, by Mr. Marnock. Some particulars of the hot-houses are given in the *Garden*, which may be usefully reprinted:—

The principal houses are ranged side by side, lying due north and south; they are 34 ft. long and 18 ft. wide, inside measure, and are ten in number, and with lean-to houses at either end. All these houses open into a covered corridor, so that every house can be entered without exposing it to cold winds. The walks in the corridor are laid with 3-in. thick Yorkshire flags, and the paths of the houses are laid with cast-iron plates, ¾ in. thick and 3 ft. wide, diamond pattern, supported on angle iron-rails and cast-iron pillars every 6 ft. This arrangement leaves the border free, for the roots of the vines, &c., to run under the paths. Out of each corridor opens a potting-shed, thus enabling plants to be carried into it without exposing them to the cold. The corridors are fitted up with tabling between the doors of the houses, for plants, and a high shelf runs the whole length, for strawberries, &c. The back walls are wired and ornamented with flowering creepers: one corridor with stove, and the other with cool climbers. The houses Nos. 6 and 7 are fitted up with pits in the centre, and slate tables round, supported on angle iron rails and cast-iron pillars. The tables are covered with small cannel coal, which furnishes drainage for the pots, and has the advantage of not becoming green, as do spar and stone. As to ventilation, the whole is worked from the two corridors by handles fixed on each side of the doors entering the houses, working, by means of bevel wheels, a perpendicular shaft with a double thread, which works into a nut attached to the levers for raising the top lights. These threads have all been cut in the lathe, are half-inch (double) pitch, and work very quickly and easily. The side ventilation is worked by means of a similar screw placed under the tabling, which opens and shuts sheet-iron doors into a ventilating-flue in the brick wall between the houses, running to the outside. This arrangement is found to give ample ventilation. Nos. 2, 6, 7, and 11 have side-light ventilation. The south lights in all the houses open if required. There is a rain-water cistern in every house, and a hot-water cistern (wood) in the boiler-house, with a pipe through the wall and a tap in the corridor. This is of large size, and supplies all the warm water for watering purposes. It is heated by a coil of hot-water copper pipes, so there is no fear of rust or other damage to the water. As regards the heating, the whole of the houses are warmed by means of three of Weeks's patent duplex upright tubular boilers; one being only for an emergency. They are so connected that either one, two, or all three can be worked together, or any one will work the whole; and any one of them can be used separately, either for the front or back range, as may be desired. The boilers are about 7 ft. high, and are doing their work admirably. The main pipes are 6-in. ones, and run the length of each corridor, branching out into each house under the doorways. Each house has valves on both flow and return pipes, as have also the main pipes. The valves used are 2-in., 4-in., and 6-in. Peet's patent valves, and, although costly in the first instance, they are certainly most complete. The pine and stove pits are made with maltkiln tiles, about 1 ft. square, supported on T iron bearers, an arrangement which necessitates a very small amount of bottom heat, and works most satisfactorily. The warm air flows through the small holes, so that it is finely divided in the mass of soil to be heated. The pines grown are principally smooth-leaved Cayenne, Queens, and Charlotte Rothschild. The mushroom-house is fitted up entirely with stone and iron, and the work has been executed throughout in the very best manner. The adoption of a plan by which all the largest houses open on to a roomy corridor much facilitates the labours of the gardeners, and permits the houses to be visited in an agreeable manner in any weather. This, or some similar plan, deserves general adoption.

Before long we shall give views and plan of the new residence here.

PROVINCIAL STREET ARCHITECTURE: READING.

WE publish this week an illustration of the market-place front of the new buildings of Messrs. Sutton & Sons, the Queen's seedsmen, of Reading, and append a short description which may prove of interest to our general readers.

During the last few years nearly the whole of the extensive premises belonging to this well-known firm have been either remodelled or rebuilt. The frontage to the market-place remained, however, until quite recently, as heretofore; but possession having been obtained of two houses immediately adjoining, the present handsome structure has been raised.

The various blocks of buildings extend from the market-place, in an easterly direction; then branching southward through Abbey-square, they join the new diversion of the King's-road, opened in 1869 by the Prince and Princess of Wales, and known as the "Prince of Wales-buildings."

The portion shown in our view is built above the ground level, of white Mansfield stone, the basement being constructed in Wheeler & Son's Reading pressed bricks set in cement.

The fascias are of Forest of Dean stone, with sunk letters gilded; the columns of Bristol blue stone and red Bishop's Lydeard alternated. Royal green slates are used for roof coverings, with ornamental cast-iron curb and hip plates, by Walter MacFarlane & Co., of London, and wrought-iron cresting by Margretts, of Reading. The stall-plates are of grey polished granite, sunk-lettered in gilt.

Of the three lower arches of the front, two are windows lighting the retail departments; whilst the third, somewhat more elaborate in design, forms, in connexion with corridors, the main entrance to the whole of the establishment.

The first-floor reached by a flight of Portland stone steps, is devoted entirely to the purposes of a library and recreation-room, and has lavatories attached.

On the second-floor are two large rooms, which may be used as private offices, or for other business purposes. There is a lofty well-lighted upper floor, partly in roof, which by means of a lift, can be connected with the ground-floor and basement.

The ground-floor is 15 ft. high; the first-floor 14 ft. The total height from the pavement line to flat of roof is 63 ft.

The whole of the joiner's work, including fittings, is of oak and pitch pine, slightly relieved with walnut, all French polished, and prepared from the architect's special designs.

Immediately at the rear of the market-place block of buildings, is the sample market, 78 ft. long, where single sacks, as specimens, of nearly all the more bulky garden and farm seeds, stacked in the larger stores are ranged for inspection. The space above the sample market is occupied as an "Order-room," for the execution of orders belonging to the departments of flower-seeds and flower-roots only. Beyond, covering an area where the largest amount of light can be obtained, are the various offices. These offices form two blocks of buildings on each side of an open area. They are lofty and well ventilated, and contain desk-room for about sixty clerks. Each block is two floors in height, so that that there are four floors, each 60 ft. long by 20 ft. wide. In these blocks also are the private offices of the principals.

With these offices terminates that portion of the premises running in a direct line from the Market-place eastward. Here, on the ground-floor from north to south, is one enormous packing-room, 290 ft. in length, covered by other floors, where seeds are weighed, measured, and got together ready to be transferred for packing.

One of the most remarkable of the departments is that devoted to the execution of kitchen-garden seed orders. Here is a room, 92 ft. in length, connected with five smaller rooms, all of which are lighted entirely from the roof. The wall-spaces thus obtained are fitted from floor to ceiling with numberless drawers and shelves, loaded with many thousands of packets of seeds, of various dimensions, ready for sending away.

The floor is occupied by a series of counters running the entire length, and these are full of drawers and bins from which a staff, chiefly of young men, continually weigh and measure the seeds and make them into parcels.

Further on to the south, the buildings are occupied by farm-seeds in sacks, piled in regular order one above another, an avenue being left down the centre. The dimensions of this portion are:—Length, 161 ft.; breadth, 34 ft. The basement portion of these stores is set apart for seed-potatoes, the total length being 138 ft., the width 34 ft.

Connected by a covered bridge with all the foregoing are numerous other stores, also the stabling and covered yard for the vans and carts of the establishment, as well as an engine-house, containing a small but powerful engine, by Shand & Mason.

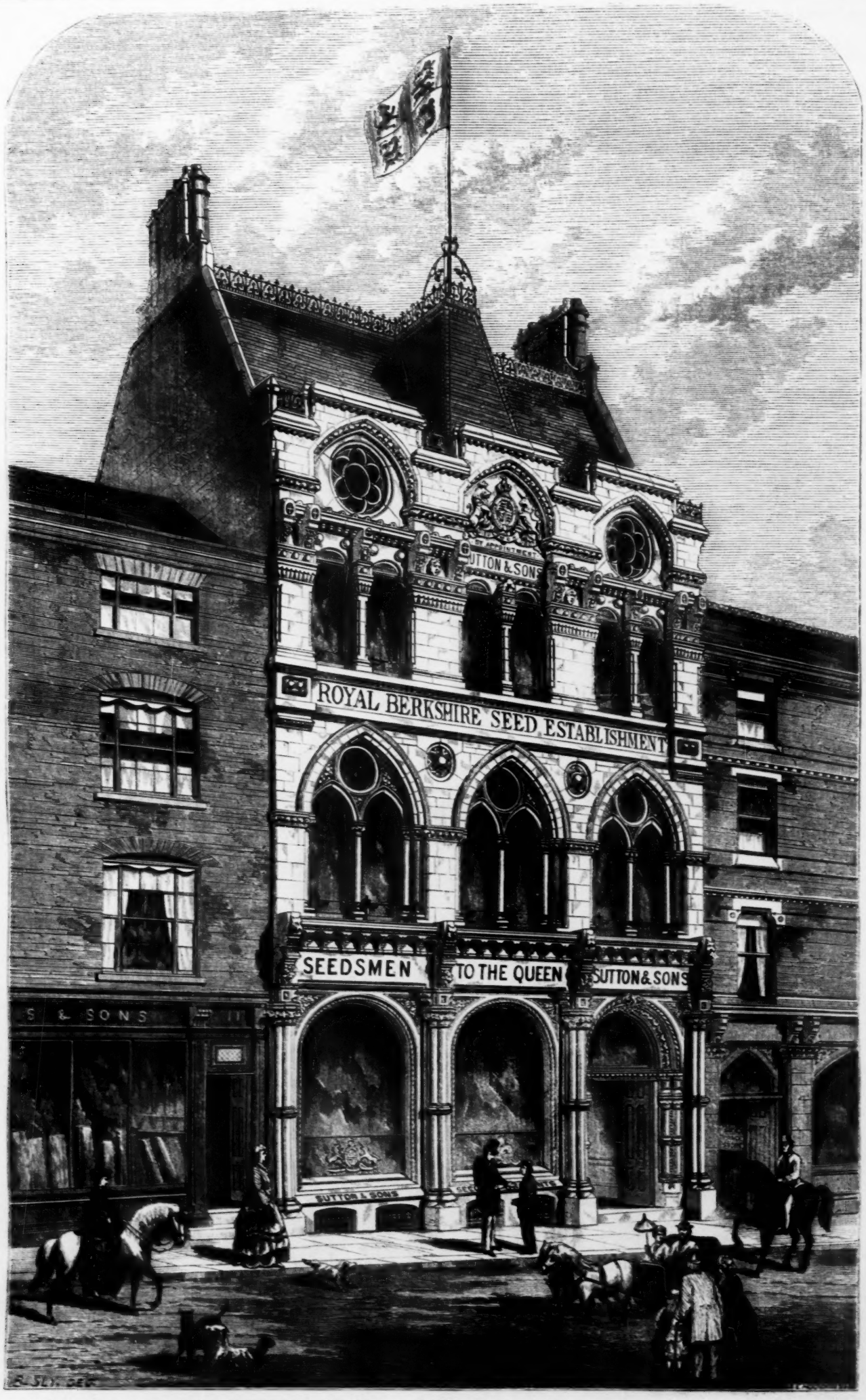
The whole is terminated by a handsome and capacious lecture-hall, completely fitted, with open-timbered roof, stained and varnished and plastered between rafters.

On the opposite side of the road, Messrs. Sutton have built and fitted up a coffee and refreshment house, which is largely used, not only by their own men, but by many others who prefer getting their meals there to the plan of resorting to an ordinary public-house.

On an adjacent portion of the King's-road, Messrs. Sutton have erected another large store for agricultural seeds, three floors in height. The superficial area of the floor-space is 5,474 ft. At the junction also of the Great Western, South-Eastern, and South-Western Railways are some extensive barns, seed-stores, and other erections attached to their experimental farm.

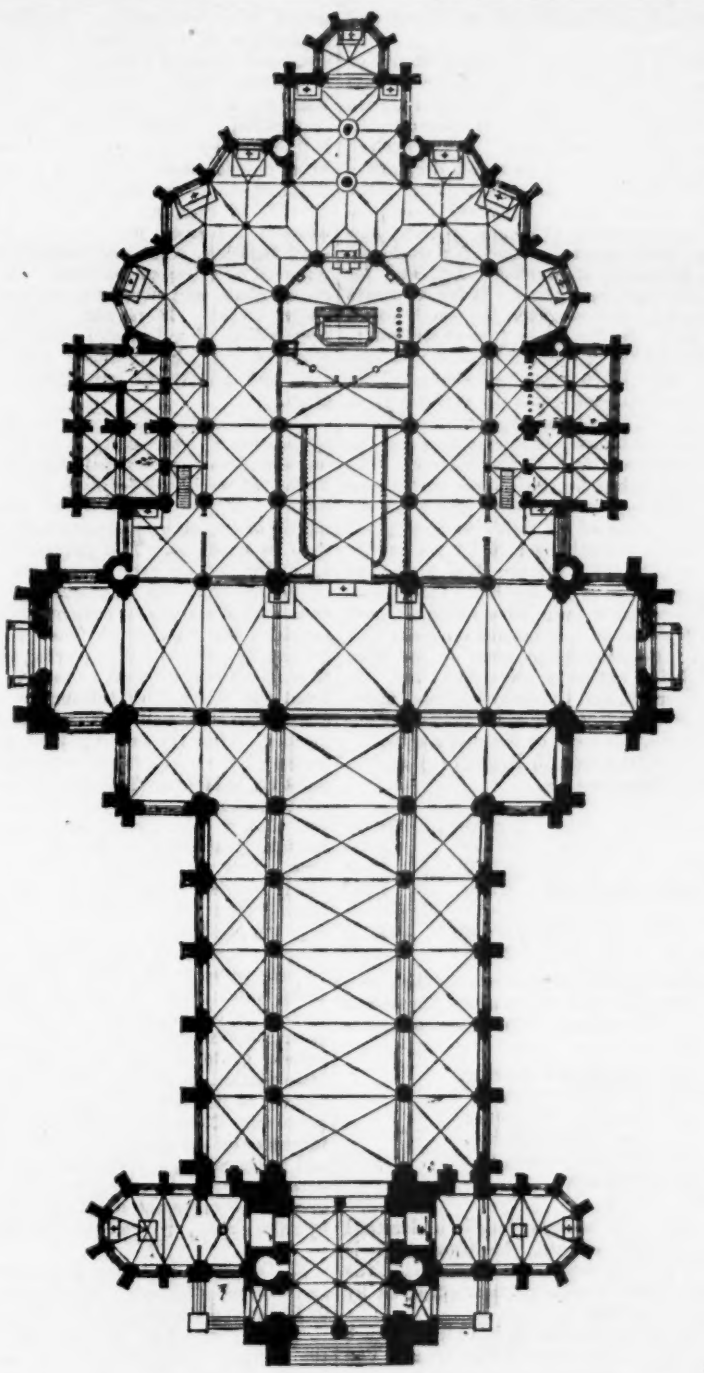
The contractors for the Market-place portion of the buildings, sample-market, &c., are Messrs. Aitchison & Walker, of Portland-yard, St. John's-wood, London, who have carried out the work very satisfactorily. The carving, in which various representations of agricultural produce are introduced, is by Earp, of London. The steel revolving shutters are by Clark & Co., of London. The encaustic paving is by MacCulla, of Victoria-street, London. The gas-fittings are by Hart, of Reading. The oak and walnut counter and fittings to the same are by Barnicoat, of Reading. The offices and portions adjacent are partly by Matthews and partly by Strong & Son, the remainder by Barnicoat,—all of Reading. Mr. Thomas Taylor acted as general foreman.

The whole has been erected from the designs and under the superintendence of Messrs. Wm. & J. T. Brown, architects, of Reading; the total cost, exclusive of land and fittings, being about 17,000*l*.



PROVINCIAL STREET ARCHITECTURE: BUSINESS PREMISES IN THE MARKET PLACE, READING, BERKS.
MESSRS. WM. & J. T. BROWN, ARCHITECTS.

THE NEW CATHEDRAL AT LINZ, ON THE DANUBE.—HERR VINCENT STATZ, ARCHITECT.



The New Cathedral at Linz, on the Danube.——Plan.

NEW CATHEDRAL AT LINZ, ON THE DANUBE.

THE new Cathedral of Linz, on the Danube, in Austria, of which we present our readers with an illustration this week, is interesting to all lovers of ecclesiology, from the fact of its being the largest Christian church now being erected in the world. When completed, it will be considerably the largest church in the Austrian dominions, and will be exceeded in size only by two cathedrals in Germany, those of Cologne and Ulm.

This noble building was commenced in the year 1860, and in the year 1864 the lady chapel and crypt were completed, and consecrated by the Bishop of Linz. Since that time the works have been steadily progressing, and it is hoped that the choir, nave, and transepts will be sufficiently advanced to admit of their being used for divine service by the year 1880. We are not accustomed to hear of churches occupying twenty years in building in the nineteenth century, but at the same time it should be taken into account that we are not in the habit of erecting churches the size of the Cathedral Church of Linz.

When it was decided to commence this edifice, a competition was announced, and the plans which were considered most appropriate being those of Herr Vincent Statz, of Cologne, he was appointed architect, and his original design is now being carried out, with very few modifications.

The materials used in the construction of this cathedral are local granite, and a fine sandstone, which is also found not far from the spot.

The church, when completed, will consist of a western tower and spire, the lower portion of the tower forming a porch 50 ft. deep. This tower will also be flanked by two other porches, leading into the western transepts. The western transepts will be terminated to the north and south by apses. To the east of these will be the great nave, of six bays, with a single aisle on either side. There will be transepts, three bays deep, with aisles both to the east and the west. These aisles, however, are a bay less in length than the transepts, so that the extreme north and extreme south bays of the transepts will be without aisles. The choir will be three bays deep, exclusive of the five-sided apse which forms its termination to the east. It will also have double aisles on either side, which will be again flanked by sacristies and chapter-house, each divided by rows of columns into two aisles. The inner aisles of the choir will be continued round the apse, and will give access to six radiating chapels and the lady chapel. The lady chapel consists of a square nave, two bays deep, with a single apsidal projection to the east.

The nave or body of the chapel is divided into two equal aisles by a spine of columns running down the centre from west to east. This chapel has three altars. The church will contain twenty altars. One of the western transepts will be screened off for a mortuary chapel, and the other for a baptistery. There will be a parochial altar at the west end of the choir, under the lantern, and one against each of the great piers of the chancel-arch. The high altar will stand on the chord of the apse, and will have a small altar for relics behind it.

The choir stalls will occupy two bays of the chancel, which will be separated from its aisles by pierced screens.

The style chosen is the Geometrical. The aisle windows will be of three lights, and those of the clearstory of four lights, except in the apse, where these will also be of three lights. The nave will be divided from the aisles by massive cylindrical columns, with octagonal bases and abaci. The triforium will be only a continuation of the lights of the clearstory windows, with cusped heads introduced, and a pierced parapet resting upon a sculptured cornice over the great arches. The whole church will be vaulted in stone.

Under the lady chapel and choir is a large crypt, vaulted in stone.

The following are the principal dimensions of this noble church:—Length, 410 ft.; width across transepts, 200 ft.; western tower, square, 65 ft. at base; nave, 40 ft. clear; height to vaulting, 96 ft.; height to external roof, 136 ft.

Some few years ago, 1867, when treating of the present condition of Ecclesiastical Architecture in Germany,* we gave a small approximate plan of the cathedral, and this for convenience' sake we now repeat.

ON THE TECHNOLOGY OF GLASS.†

Various Kinds of Glass.—Glass is separated, according to its composition or method of manufacture, into:—

I. *Glass free from Lead.*

A. Plate-glass.
  a. Window glass:—
    a. Rolled glass.
    b. Crown glass.
  b. Plate-glass:—
    a. Blown plate-glass.
    b. Cast plate-glass.

B. Bottle glass:—
  a. Ordinary bottle glass.
  b. Medicine and perfumery glass.
  c. Glass for goblets, drinking-glasses, &c.
  d. Water pipes and gas tubes.
  e. Retort glass.

C. Pressed or stamped glass.

D. Water glass.

II. *Glass containing Lead (Flint-glass).*

A. Crystal glass.
B. Glass for optical purposes.
C. Enamel.
D. Strass.

Plate or Window Glass.—The glass melted in muffles or vessels is manufactured as plate-glass or as crown-glass. Plate-glass, as its name implies, is formed in large or small plates; window-glass is generally either ordinary bottle-glass or a finer glass of a whiter colour. Recently, thick has taken the place of thin glass for windows, but the colour is hereby considerably increased. That window-glass should be prepared cheaply is an essential point, consequently crude materials are employed,—crude potash and soda, wood-ash, Glauber's salt, ordinary sand, and broken glass from the warehouses, &c. Plate or window glass is generally composed of 100 parts sand, 30 to 40 parts of crude calcined soda, 30 to 40 parts of carbonate of calcium. Instead of the soda may be substituted an equivalent quantity of Glauber's salt. Benrath (1869) found in several kinds of plate-glass the following constituents:—

Silicic acid	70·71 ...	71·56 ...	73·11
Soda	13·35 ...	12·97 ...	13·00
Lime	13·58 ...	13·27 ...	13·24
Alumina and oxide of iron	1·92 ...	1·29 ...	0·83
	99·46	99·09	100·18

Plate-glass is manufactured as crown-glass or as rolled glass.

Crown-glass.—Crown-glass is the oldest kind of window-glass. It is formed in the manufacture as a disc of glass, generally of about 6 in. in radius from the periphery to the centre knot

* Vol. xxv., p. 793.

† From "A Handbook of Chemical Technology." By Rudolf Wagner, Ph.D., Professor of Chemical Technology at Wurtzburg University (already noticed in our pages). Translated and edited by William Crookes, F.R.S. Churchill, New Burlington-street.

left by the glass-blowers' pipes, technically termed the bull's-eye. The largest discs are scarcely 64 in. to 66 in., from which a square plate of 22 in. only can be cut, the bull's-eye interfering with the cutting of a larger size. In the preparation of this glass three workmen are employed: the first takes so much molten glass on the end of a pipe as will serve for a single disc, and passes pipe and glass to the second workman, the blower; he blows the glass into a large globe or ball, which, when finished, he hands to a third workman, the finisher, who opens the globe, and forms the sheet or pane. The labour is divided in detail in the following manner:—The first workman receives the warm pipe, thrusts it into the vessel of molten glass, and turns it steadily round until he has collected upon the end a knob of glass of sufficient size. The weight of this knob is generally 10 lb. to 14 lb. The first workman imparts somewhat of a spherical form by means of the marbel to the solid glass ball, which is now taken in hand by the blower, who, by turning and shifting the glass about, at the same time blowing through the tube, perfects the hollow spheroid. The glass has by this time cooled considerably, and, with the pipe, is therefore returned to the oven, the tube of the pipe being fastened in a fork or in a hook in the ceiling of the oven. As the globe of glass is gradually heated the weight of the rod causes it to flatten out, and it is removed by the finisher as a disc of nearly-molten glass. He places the tube in the cavity of the whip, and by a series of dexterous movements perfects the shape, enlarges the disc if required, or in some cases makes a larger disc by removing the partially flattened sphere from the oven, opening the bottom with a maul or iron rod, and causing the glass to take the form of a disc by means of the centrifugal force resulting from a rapid rotatory motion of the rod. Finally the discs are separated from the pipe by the help of a drop of cold water, and are next placed in an annealing oven, to the number of 150 to 200, to cool. The finished plates are cut to the required size; the centres or bull's-eyes serve for the making of strass and for other purposes.

Sheet-glass, or Cylinder-glass.—Rolled or sheet glass is made by cutting a glass cylinder or roll throughout its length, and beating or rolling it out flat on a table. It is for this reason termed sheet-glass. Usually this sheet-glass is used for ground glass, and is further separated into ordinary sheet or roll glass and fine sheet-glass, the latter having larger dimensions.

The preparation of sheet-glass is one of the most difficult processes of glass-manufacture: it may be considered as consisting of two operations:—

1. The blowing of the roll, or cylinder; and
2. The flattening.

After the molten glass has cleared, and attained the barely fluid consistence before mentioned, the workman inserts his pipe into the mass, and by turning manages to accumulate on it a globe of glass, during the time blowing into the tube to keep it clear of the molten glass. The glass now takes the form *a*, Fig. 135. By continued manipulation in the marbel, and by blowing, the enlarged forms, *b* and *c*, and finally *d*, are obtained. The glass has by this time cooled, and is taken to the oven to be reheated. When this is effected, the workman, by means of his tools, by a continued rotation of glass, and by blowing, brings the globe to the shape represented by *f*. He then opens out the bottom of this form with a maul-stick, and obtains the cylinder *e*, which is separated from the pipe by dropping a little cold water on the neck, *o*, joining the two. The removal of this neck is next effected by means of a red-hot iron rod, which also serves to open the cylinder throughout its length.

After a great number of these cylinders have been blown, the operation being generally continued for three days, the opening into plates is commenced. The cylinders are placed in an oven termed the plate-oven, consisting of two chambers, one the heating-room, and the other the tempering or annealing room. In the passage the heated glass rolls or cylinders are suspended upon two iron rods, where they are maintained at a certain heat. The most important part of the plate-oven is the platten, made of a well-rammed fire-clay. A similar plate is placed in the annealing-room. When sufficiently heated, the cylinders are brought to the flattening-table, where they are speedily opened out. A workman receives the flat panes of glass, and leans them against iron bars, in the annealing-room, whence, having gradually cooled during four to five days, they are removed to be sorted and packed.

Plate-glass.—Plate-glass is either blown or cast. The manufacture is very similar to that of table-glass just described. The materials are in great part the same as those employed in the manufacture of fine white glass. This branch of glass-manufacture is most strikingly illustrative of the rapid growth of the industry during the last ten or twenty years. Formerly plate-glass was esteemed an article of luxury, whereas now it is that most generally used for workshop windows, carriages, show-rooms, &c., and for windows of private residences. It far surpasses in transparency and elegance the small panes formerly used. By the glass jury of the International Exhibition of Paris of 1867, it was surmised that before ten years had elapsed plate-glass would be that most generally in the market. The blowing of plate-glass is effected with the same tools as the blowing of table-glass; and the cylinder is obtained in a similar manner. The lump of glass taken by the blower on his pipe from the melting-vessel weighs about 45 lb., from which a plate of 1·5 mètre in length and 1 to 1·1 mètre breadth by 1 to 1·1 centimètre thickness is obtained. But the chief method of making plate-glass is by casting. Cast plate-glass is always made from pure materials, and may be considered as a soda-calcium glass free from lead. Potash-calcium glass is far more expensive, being almost a colourless glass. In England, Belgium, and Germany the raw materials used in manufacturing cast plate-glass are sand, limestone, and soda, or Glauber's salts.

Benrath (1869) found in English (*a*) and in German (*β*) plate-glass:—

	a		*β*
Silica	76·300	...	78·750
Soda	16·550	...	13·000
Lime	6·500	...	6·500
Alumina and oxide of iron	0·650	...	1·750
	100·000		100·000
Sp. gr.	2·448		2·456

The following description of casting the plates is mainly founded upon the method pursued at St Gobin and Ravenhead. The manufacture is included in,—

1. The melting and clearing,
2. The casting and cooling,
3. The polishing: including
   - *a*. The rough-polishing.
   - *β*. The fine-polishing.
   - *γ*. Finishing.

* * * *

Water-glass.—By water-glass is understood a soluble alkaline silicate. Its preparation is effected by melting sand with much alkali, the result being a fluid substance, first observed by Von Helmont, in 1640.

It was made by Glauber in 1648 from potash and silica, and by him termed fluid silica. Von Fuchs, in 1825, obtained what is now known as water-glass by treating silicic acid with an alkali, the result being soluble in water, but not affected by atmospheric changes.

The various kinds of water-glass are known as potash water-glass, soda water-glass, double water-glass, and fixing water-glass.

Potash water-glass is obtained by the melting together of pulverised quartz or purified quartz sand 45 parts, potash 30 parts, powdered wood charcoal 3 parts, the molten mass being dissolved by means of boiling in water. The solution contains much sulphuret of potassium, which is removed by boiling with oxide of copper. . . . .

Water-glass is an important product in industry. It is used to render wood, linen, and paper non-inflammable. The water-glass of 33° is first mixed with double its amount by weight of rain-water, and is then treated with some fire-proof colouring matter, as clay, chalk, fluor-spar, felspar, &c. The material to be rendered uninflammable is painted with the solution, and again with another coat, after the first has remained twenty-four hours to dry. Wood is thus preserved from being worm-eaten, from encrustation of fungi, &c. Another industrial application of water-glass is as a cement. In this it is equal to lime, and, indeed, is known as "mineral lime." Chalk mixed with water-glass forms a very compact mass, drying as hard as marble. No chemical change is hereby effected; there is no conversion to silicate of calcium, or carbonate of potash; the hardening is entirely the result of adhesion. Phosphate of calcium treated with water-glass acts similarly. Zinc-white and magnesia lose none of their useful properties when mixed with water-glass. Another important application of water-glass is in the painting of stone and concrete walls, and in the preparation of artificial stone. The latter, first made by Ransome, is daily meeting with more extended application in England, India, and America. It is prepared by mixing sand with silicate of soda to a plastic mass, which is pressed into the required shape, and then placed in a solution of chloride of calcium. By this means silicate of calcium is formed, and cements the grains of sand together, while the chloride of sodium is removed by repeated washings. As cement for stone, glass, and porcelain, water-glass is especially useful. It is also employed in the preparation of xyloplastic casts, made of wood rendered pulpy by treatment with hydrochloric acid, and afterwards impregnated with water-glass.

Stereochromy.—An interesting and important application of water-glass is in the new art of mural and monumental painting, termed by Von Fuchs, *Stereochromy* (*στερεος, solid*, and *χρωμα, colour*). There is first to be considered the mortar or cement ground upon which the painting is to be executed. This ground has to receive an under and an over ground. It is essential, of course that the fundamental groundwork should be of a stone or cement possessing every requisite for durability. The next, or under-ground, is made with lime-mortar, and is allowed to remain for some time to harden. When well dried the water-glass solution is applied, and allowed to soak well into the interstices of the mortar. After the under-ground has been thus prepared, the over-ground, or that to receive the painting, is laid on. This consists of similar constituents to the under-ground, with the exception that a good sharp sand is used, and the mixture treated with a thin ley of carbonate of lime. This over-ground of fine cement being nicely levelled, and having dried, it is thoroughly impregnated with water-glass. When this is dry, the painting is executed in water-colours. Nothing further is necessary than to fix these colours, which is effected by a treatment with a fixing water-glass. The colours employed are:—zinc-white, chrome-green, chrome-oxide, cobalt-green, chrome-red (basic chromate of lead), zinc-yellow, oxide of iron, sulphuret of cadmium, ultra-marine, ochre, &c. Vermilion is not employed, as it changes colour in fixing, turning to a brown. Cobalt-ultramarine, on the contrary, brightens on the application of the fixing solution, and is, therefore, a very effective colour. As a decorative art, stereochromy will doubtless attain great importance, the paintings being unaffected by rain, smoke, or change of temperature.

* * * *

Strass.—The imitation of precious stones is an interesting feature of glass-manufacture, and in Egypt and Greece it is an art that has attained to great perfection. All precious stones, with the solitary exception of the opal, can be imitated artificially. The chief constituent of these artificial gems is *strass*, or as it is termed by Fontanier, Mayence base; and in France artificial gems are mostly known as *Pierres de Strass*. This base, then, is colourless, and may be considered as a boro-silicate of the alkalies containing oxide of lead, this being in larger proportion than in flint-glass.

Donault-Wieland found colourless strass, by analysis, to consist of:—

Silica	38·1
Alumina	1·0
Oxide of lead	53·0
Potash	7·9
Borax } Arsenious acid } ...	traces
	100·0

This analysis gives the formula:—

$$(3K_2O,6Si,O_2)+3(3PbO,6SiO_2)$$

The various gems are imitated by the addition of colouring oxides, the whole of the materials being ground to a fine powder, intimately mixed, and melted at a strong heat. The imitation of the *topaz* is obtained by taking,—strass, 1,000; antimony, 40; and Cassius's purple, 1 part. The topaz can also be imitated with,—strass, 1,000; oxide of iron, 1 part. The imitation *ruby* is obtained with 1 part of the topaz paste, and 8 parts of strass, the whole being melted together for thirty hours. A ruby of less beauty is obtained with,—strass, 1,000; peroxide of manganese, 5 parts. A good *emerald* can be prepared from,—strass, 1,000; oxide of copper, 8; oxide of chromium, 0·2 parts. The *sapphire* is obtained from,—strass, 1,000; pure

oxide of cobalt, 15 parts. The *amethyst* from,—strass, 1,000; peroxide of manganese, 8; oxide of cobalt, 5; Cassius's purple, 0·2. The *beryl* or *aqua marina* is imitated by,—strass, 1,000; glass of antimony, 7; oxide of cobalt, 0·4. The *carbuncle* by,—strass, 1,000; glass of antimony, 500; purple of Cassius, 4; peroxide of manganese, 4 parts. Much attention has not been paid to the mode in which the colouring is effected by the metallic oxides; nor have experiments been tried with any definite result as to the application of tungstic acid, molybdic acid, titanic acid, chronic acid, and protoxide of chromium, &c.

Coloured Glass and Glass-staining.—Coloured glass may be considered in two classes—that coloured as a whole, and that only partially coloured. The latter is prepared with such metallic oxides as will impart to the glass very intense colour; for instance, protoxide of copper, protoxide of cobalt, oxide of gold, and oxide of manganese. This kind of glass is termed superfine, and is prepared in the following manner:—Two melting vessels are placed in the oven; one contains the lead glass, the other the coloured glass. We will take as an example glass coloured red with protoxide of copper, which if further oxidised imparts a green colour to the glass. The glass-blower dips his pipe first into the red glass, and collects a sufficient quantity to blow; then he dips this into the white glass, and proceeds to form a cylinder or roll, as in the making of table glass. Superfine glass is known as "outside" and "double," or "double layer." In the first case the workman takes a lump of white glass upon his pipe and covers it with the coloured glass; or, in the second case, he takes up only a small quantity of white glass, then sufficient of the coloured glass, and again more white glass. Red glass may be obtained with either Cassius's purple, protoxide of copper, or oxide of iron as the colouring ingredient. Cassius's purple is used chiefly for ruby-red glass. It was long thought that ruby-coloured glass could not be obtained with any other preparation than Cassius's purple; but twenty-five years ago Fuss showed that chloride of gold was effectual. If glass containing salts of gold or protoxide of copper is cooled suddenly, the colour disappears; then if again gently warmed, not quite to softness, the colour suddenly reappears in full splendour. This phenomenon occurs equally in atmospheres of oxygen, hydrogen, and carbonic acid. In the preparation of protoxide of copper glass, lead-glass is taken as a basis, to which 3 per cent. of the protoxide is proportioned. The drawback to the employment of the protoxide is the readiness with which it becomes oxide, this imparting a green colour to the glass. To prevent this change iron filings, rust, or tartar, is added, or the glass is stirred with green wood. Copper-glass, as has just been said, is colourless on cooling, regaining its colour during the process of annealing. Oxide of iron, known commercially as blood-stone, ochre, or red chalk, is also used to impart a red colour. Yellow and topaz-yellow are obtained by means of antimoniate of potash or glass of antimony, chloride of silver, borate of oxide of silver, and by sulphuret of silver. Oxide of uranium imparts a green-yellow. Blue is obtained from oxide of cobalt, more seldom by means of oxide of copper. Green results from the addition of chrome-oxide, oxide of copper, and protoxide of iron. Violet is obtained from oxide of manganese (braunite) and saltpetre; black, from a mixture of protoxide of iron, oxide of copper, braunite, and protoxide of cobalt. A beautiful black results from sesquioxide of iridium.

Glass Painting.—The delineation of figures and Scriptural events in coloured glass dates from a very remote period. At first the work was merely mosaic, pieces of coloured glass being inserted in leaden framework. Glass painting was known in Germany in the Middle Ages, and soon extended throughout Europe. In the thirteenth century, when Gothic architecture became prevalent, glass painting also became more general, as until then the heavy, round-arched windows were too small to admit of ornament. But it was not until the fifteenth century that the heavy outlined figures were discarded for the more mingled colours of heraldic device, as seen in the churches of Sebaldus and Lorenz, of Nuremburg, in the productions of the celebrated Hirschvogel family. This style lasted till the sixteenth century, when the glass-maker tried the effects of pigments upon glass. Since that time the art has gradually improved, the improvement at first being most manifest in France and the Netherlands.

The nature of glass painting or staining is in principle the following:—When coloured glass, rendered easily fusible by the metallic oxide it contains, is finely pulverised, and laid upon a plain glass surface and heated, it forms a skin, or "flash," as it is termed, this skin or layer of glass being said to be "flashed on." It is evident that very brilliant effects may thus be attained. The near surface of the glass receives the strong shades and colours, the other or distant surface the lighter tints. White was not employed in the older glass-paintings, but is now used in the flesh tints, pure white effects, &c. Oxide of tin and antimoniate of potash yield a good white. For yellow, Naples-yellow, or antimony-yellow, or a mixture of the oxides of iron, tin, and antimony, or of antimonic acid and oxide of iron, of sulphuret of silver and sulphuret of antimony, or chloride of silver is used; for red, oxide of iron, purple of Cassius, and a mixture of oxide of gold, oxide of tin, and chloride of silver; for brown, oxide of manganese, yellow ochre, umber, and chromate of iron; for black, oxide of iridium, oxide of platinum, oxide of cobalt, and oxide of manganese; for blue, oxide of cobalt, or potassium-cobalt nitrate; for green, the oxides of chromium and copper. Two kinds of colour are distinguished,—the hard and the soft. The soft are called varnish colours, are not very easily fluid, forming a kind of glaze upon the glass. These colours are placed upon the outer surface. The hard or decided tints are semi-opaque, and are placed upon the inner surface of the glass. The binding fluid or vehicle is a mixture of silica, minium, and borax, with which the colour, being previously ground to a fine powder, is intimately mixed. This mixture is painted on the glass with a pencil, and the glass plate is afterwards fired in a muffle. Recently volatile oils have been employed as a vehicle, viz., oil of turpentine, lavender bergamot, and cloves. The burning-in or firing, the colours was formerly effected by placing the glass tablet with dried and pulverised lime in an iron pan raised to a red heat. But recently the muffle-oven has been employed. The bottom of the muffle is covered to a depth of 1 in. with dry powdered lime, upon which the plate of glass is laid, and again a layer of lime. The oven is then raised equally to a dark red heat. After six to seven hours the fire is gradually withdrawn, and the oven allowed to cool. The glass is taken out, cleansed with warm water, and dried.

Enamel.—Bone Glass.—Alabaster Glass.—By enamel is understood, in glass-manufacture, a coloured or colourless glass mass, rendered opaque by the addition of oxide of tin. It formerly was prepared in the following manner:—An alloy of 15 to 18 parts tin and 100 parts lead was oxidised by heat in a stream of air, the oxide pulverised and washed. The mixture of the oxides was then fritted with the glass. An enamel-like appearance is imparted to glass by arsenious acid, chloride of silver, phosphate of calcium, cryolite, fluor-spar, aluminate of soda, and precipitated sulphate of barium. Bone-glass, so called, is a milk-white, semi-opaque glass, containing phosphate of calcium in the shape of white bone-ash, sombrerite, or phosphorite. It is employed for lamp-globes and shades, thermometer-scales, &c. It is made by adding to white glass about 10 to 20 per cent. of white bone-ash, or a corresponding quantity of mineral phosphate. After melting the glass is generally clear and transparent, becoming milk-white and opaque during the process of blowing. The colour is finally developed during annealing. A similar glass to the preceding is alabaster glass, but the latter is more opaque. It is also termed opal glass, rice glass, or rice-stone glass, and Réaumur's porcelain. The materials are the same as in the preparation of crystal glass, of which it may be considered the scum or underlayer of impurities, though it is really imperfectly-prepared crystal glass.

Cryolite Glass.—Cryolite glass, or hot-cast porcelain, has recently been manufactured in Pittsburg. It is a milk-white glass, obtained by melting together

Silica	67·19 per cent.
Cryolite	23·84 „ „
Oxide of zinc	8·97 „ „

Fluor-spar or aluminate of sodium may be substituted for cryolite. Benrath found (1869) in such a milk glass—

Silica	70·01 per cent.
Alumina	10·78 „ „
Soda	19·21 „ „
	100·00

Aventurin Glass.—Aventurin or avanturin glass was formerly made only in the Island of Murano, near Venice, but is now prepared throughout Germany, Italy, Austria, and France. It is a brown glass mass in which crystalline spangles of metallic copper according to Wöhler (of protoxide of copper according to Von Pettenkofer) appear dispersed. Fremy and Clemandot have produced a glass similar to aventurin glass, and which consisted of 300 parts glass, 40 parts protoxide of copper, and 80 parts copper-scale. The Bavarian and Bohemian glass houses produce an aventurin glass rivalling the original. Von Pettenkofer has prepared aventurin glass direct from hæmatinon by mixing sufficient iron filings with the molten mass to reduce about half the copper contained. Pettenkofer surmises, and with good reason, that aventurin glass is a mixture of green protoxide of copper glass with red crystals of silicate of protoxide of copper, these complementary colours giving the brown tint. This glass is also well imitated by melting a mixture of equal parts of the protoxides of iron and copper with a glass mass. The protoxide of copper appears after a long annealing as a separate, crystalline, red combination, while the protoxide of iron is lost in the green colour it imparts to the glass. Pelouze found that by freely adding chromate of potash to the glass materials spangles of oxide of chromium were separated. He termed this glass chrome-aventurin; it has been employed by A. Wächter in the glazing of porcelain.

Hyalography.—Hyalography, or the art of etching on glass, is due to one Heinrich Schwankhardt or Schwandard, an artist living at Nuremburg in 1670. It consists of the following operations:—Powdered fluor-spar is treated with concentrated sulphuric acid in a leaden vessel; gentle heat is applied, the vessel being covered with the glass plate to be etched coated with wax, through which the design is traced with a steel etching-needle. Vapours of hydrofluoric acid (FlH) are evolved, which combine with the silica of the glass, forming fluoride of silicon, $SiFl_2$, and volatilising. The plate is afterwards washed with warm oil of turpentine. The first practical application is due to Hann, of Warsaw, in 1829. More recently, Böttger and Brömeis, with Auer, of Vienna, have improved the processes. The etching-ground used for engraving on metallic surfaces, would not in this case give favourable results. Pül recommends a molten mixture of 1 part asphalt and 1 part colophonium, with so much oil of turpentine as will bring the mass to the consistency of a syrup. Etched glass plates have been used by Böttger and Brömeis to print from instead of steel and copper. In the press the glass plate is backed by a cast-iron plate. The process, however, has not been practically successful: it is better suited to the production of bank-notes, &c., than engravings, the resulting etchings being hard in tone. But for purposes of decoration, etched glass is largely used. By the method of Tessié du Motay and Maréchal of Metz, a bath is made of 250 grms. of hydrofluoride or fluorid of potassium, 1 litre of water, and 250 grms. of ordinary hydrochloric acid. Kessler employs a solution of fluoride of ammonium.

The new and very curious sand process is not noticed in the peesent edition of Professor Wagner's work, so far as we can see; no doubt it will appear in a future edition.

THE TRADE-UNION CONGRESS AT LEEDS.

THE fifth annual Congress of Trade Unions continued throughout last week, and is now at an end. One hundred and thirty delegates were present from all parts of England and from Scotland. The report of the Parliamentary Committee was read by Mr. Howell, who dwelt on the peculiar significance both of the labour movements and of the labour legislation of the year. The report was a document of great length, which would fill about six ordinary newspaper columns. It commences thus:—

"The year that has just closed marks an era in this trio of trade-unionism. Movements which had been retarded for years have come to the front, and many concessions had been obtained which had appeared to many to be almost hopeless. Foremost among these must be named the agitation that has taken place among the agricultural labourers for better pay and more definite hours. We rejoice to see this vigorous movement, and hold out to them, and wish them, God speed. The nine-hours movement, which originated with the building trade in London in 1859, had sunk into lethargy until the engineers of Sunderland and Newcastle gave a fresh life, and secured their great victory in the autumn of last year. This was soon followed by an active agitation on the part of the

engineers all over the country, and January, 1872, opened with a general concession of the nine hours per day in all the leading engineering establishments of the kingdom. The building trades of London followed with a similar demand, and, after a severe struggle, won. The nine-hours day now bids fair to become general all over the country. The bakers, whose long hours and short pay have long been the theme of philanthropic sentiment, have eagerly and earnestly taken in hand their own work, the result being that in many places they have obtained the concession of a better defined day, together with a substantial rise in wages. Your committee have seen with much pleasure the great growth of trade-unionism during the year. The increase of members has been unprecedented."

The meetings were orderly and moderate in tone. The subjects discussed included the limitation of the number of apprentices to be employed, the tendency of piecework, the competition caused by prison labour, the application of the principle of arbitration to international disputes, and the propriety of returning representative working-men to Parliament.

The following were among the resolutions that were passed:—

That as the principle of arbitration and its application to the settlement of disputes between employer and employed has been economically and morally beneficial to both, this Congress believes that the time has arrived when the principles should be extended to the settlement of disputes between nations, and inasmuch as the law and its equitable administration is the first element of peace in civilised society, and as the absence of international law and international tribunals leads to misunderstanding, conflicts, and war between nations, paralysing industry, entailing heavy financial burdens on the people, increasing the cost of their food, and generally retarding the progress of their civilisation, it is resolved to memorialise the House of Commons to take the necessary steps towards forming a code of international law, and the establishing of an international tribunal; and that the chair sign such memorial on behalf of the Congress.

That it be an instruction to the Parliamentary Committee to be appointed to prepare a Bill founded upon the 1st, 2nd, and 3rd points or suggestions contained in Mr. Crompton's paper, to be submitted to Parliament with the following additions:—"First, to provide for the repeal of all unjust and oppressive penal legislation relating to trade-unions; and to clearly define and consolidate the law into one Act relating to conspiracy, coercion, and intimidation. Secondly, that where a committal takes place before the stipendiary magistrates for any alleged breach of the law arising out of trade disputes between employers and employed, the jury selected to try all such cases shall be taken from the electoral register, either by ballot, or as their names stand in rotation on the said register."

That in the opinion of this congress the system of piecework, as practised in some of the most influential trades of the United Kingdom, is detrimental to the best interests of trade-unions, tends to lower wages, defeats the objects of the short-time movement by giving into the hands of the employers a weapon to use against workmen, and for defrauding the public generally; and further, that this congress recommends to all delegates present to use their influence with their respective societies to do all they can to abolish such a pernicious system.

Mr. Hickes, Leeds, read a paper on the subject of the limitation of apprentices, having special reference to the letter-press printers of Leeds. The writer contended that a journeyman had a right to protect himself, and decline to work with any number of boys a master might think fit to employ. In a vast number of cases—he believed in much the larger proportion—the masters did not train, instruct, and fit the boys to become competent journeymen. That was cast upon the journeymen, and the latter had a fair right to say with how many boys as apprentices they would work.

No resolution was passed upon the subject.

Mr. Cremer, London, moved the following resolution:—

"That this congress are of opinion that the present high prices of coal and iron are due to a combination of coal-owners, and iron-masters, and capitalists, and that such combination is a conspiracy of a graver and much more serious character than the so-called gas-stokers' conspiracy, and instructs the Parliamentary committee to institute such proceedings in a court of law against either coal-owners or iron-masters, with a view of ascertaining whether the laws of combination and conspiracy are so framed as to apply to all who combine and conspire, or whether they have been enacted especially to crush combination on the part of working men."

The Congress, however, declined to vote upon this resolution, or rather both it and an amendment on it were rejected.

FATAL BRIDGE ACCIDENT WITH A TRACTION ENGINE AT WOKING.

AN accident, which has proved fatal to three unfortunate men at Woking, keeps the adjacent locality in a state of excitement. The nature of it will appear from the inquest proceedings before Mr. Hull, the coroner for the district, on the bodies of George Reed and William Bird, engine-driver and stoker of the traction engine, who were killed by the catastrophe.

Mr. Miskin, the owner of the engine, was the first witness called. He deposed that the engine was dragging a thrashing-machine to Paper Farm, and it had to cross the bridge after going down Woking-hill. The engine had repeatedly crossed the bridge before, and it weighed about 9 tons, while the machine weighed 3 tons more. The engine was going at the rate of three miles an hour. He gave orders to his men not to venture over unsafe bridges, but as no notice was posted up at this bridge to say it was unsafe he took it for granted it was all right. Some time ago, not thinking the bridge safe, he applied to Mr. Drewitt, and asked him to strengthen it. Mr. Drewitt declined, but gave him some timber, and he strengthened the bridge himself. The old piles were worm-eaten, and he put some new ones in.

In answer to Mr. Smallpiece, who appeared for the Earl of Onslow, the witness said he commenced business with the engine four years and a half ago, and he strengthened the bridge four years ago. He had no means of testing the bridge, but he did his best to avoid all risk of accident. He applied to Mr. Drewitt to strengthen the bridge, but he refused, and said the bridge was good enough for their purposes; but he gave him some timber to strengthen the bridge. It was used for that purpose. The first time the engine went over the bridge he steered it himself. The men with the engine did not carry anything to strengthen the bridges they went over; but in the case of Cart Bridge it was strengthened every time the engine went over it, and the timbers used were kept at a public-house near. George Reed, the driver, had absolute charge of the engine. The same engine and the same driver had frequently gone over the bridge before. No notice of the unsafe condition of the bridge was posted up, and he had never been warned against it. The inquest was adjourned.

A SONG OF HEALTH.

CRIME may crouch with a skeleton-key,
But Plague need unlock no door,
He comes all hours of the night and day
And visits both rich and poor.
The veriest hind, the wealthiest lord,
Will wither beneath his breath;
There's honour in falling by the sword,
But plague brings disgraceful death.

Want and sorrow may visit us all,
And find us free of all blame;
But when by our own neglect we fall,
Then ours are the sin and shame.
Men may talk of the chastening rod,
Yet plague should strike none down;
The laws of health are the laws of God,
They can save a man or a town.

Oh! Statesmen of Britain, rouse ye up,
The way and the will be thine;
The people drink of the poison'd cup,
As if it were blood-red wine.
Think of the millions of human souls
In the lap of want and wealth,
O'er whom the tide of contagion rolls,
And strike a blow for Health!

DECORATION OF BRUNSWICK CHAPEL, BERKELEY-ST., PORTMAN-SQUARE.

THIS chapel, which some few months ago was re-constructed under the direction of Messrs. Hesketh & T. H. Watson, with the exception of internal colouring, has,—under the direction of the architect to the Portman Estate, Mr. F. W. Hunt,—lately been completed.

The walls are finished in a warm stone-grey with a dado seat high in Indian red, finished with lines and running stencil ornament in blue and red, which are also continued round the windows.

The wall-space over the Communion-table is formed into a reredos, in colours and gold, as follows:—

The surface is divided into five panels—a square one in the centre, and two arched panels on each side of the same, the outer one on the right being occupied by the "Lord's Prayer," the outer one on the left by the "Belief"; the inner arched panels have the "Ten Commandments"; the ground of the panels is in a deep blue, the text being in gold. Each panel is separated by a border in stone vellum, outlined in deep red. The spandrels formed by the circular heads are in olive green, and filled with a suitable scroll ornament upon a diapered ground. The centre, or square panel, has at each side a pilaster, upon which are inlaid panels: these are in two hues of Indian red, the panels being filled with a diaper of self hue. From under the panel springs a Greek cross, the ends of which show each way in gold, with diaper pattern upon them, upon a dark silver grey ground; this ground is enclosed by circular lines, and an ornamental border in deep brown and gold.

The church was not closed during the progress of the works, which were executed within a month. The designs were made and the work carried out by Messrs. W. Phillips & Son, Baker-street, Portman-square.

ATHENÆUM, CAMDEN-ROAD.

THIS building was opened on the 11th inst. by the Lord Mayor, president of the institution. The second portion now completed comprises,—on the ground-floor, a reading-room, 40 ft. by 25 ft., and 21 ft. high in clear, and two offices or libraries for books. On the mezzanine floor, retiring-rooms, and on the first-floor a public room, 40 ft. by 25 ft., and 14 ft. high in clear; and four smaller rooms. The basement, which extends throughout, is 9 ft. high in clear, and in it are the keeper's rooms, heating-chamber, and coal-cellar. The staircase to the first floor is 4 ft. 6 in. wide, and that to the basement 4 ft. wide. The exterior of the building is very plain, owing to al the decorative features originally intended having been omitted, to reduce the cost. On the angle of the building is an illuminated clock. The contract for this portion of the building (not including the clock) was entered into with Messrs. Gregory & Knight, for 2,345*l.*, subject to an allowance in respect of the increased rate of wages. The architect is Mr. Frederick Meeson.

THE ENGLISH SCHOOL OF SCULPTURE.

SIR,—In your recent critique of Professor Lübke's "History of Sculpture," you gave a well-merited and much-needed vindication of modern English sculpture. Of the Gothic sculpture of the Middle Ages, that of England certainly shared in the excellence and completeness, if not superiority, of its architecture, as compared with that of Continental Europe, whether as an integral and decorative part of the architecture, or in tombs, the effigies upon many of which still bear abundant witness to the technical excellence of the art, and to full power in purity of feeling and appropriateness of expression. But it is in regard to our modern and existing sculpture that it seems to be taken for granted that we have very little to be proud of, and which it has long been a fashion with would-be critics to decry or speak of with a sort of pitying contempt, unless a purpose had to be served in exalting the name of some present favourite, whose work would otherwise have remained in congenial obscurity. There has been too much of this sort of thing, and the proper estimate of English sculpture has doubtlessly been most injuriously affected thereby, both at home and abroad. The fact is, that the modern English school has languished for lack of encouragement for the higher works of genius. The only two conditions under which the Fine Arts can really flourish have been lamentably wanting in the modern period: these are, when art forms part of the life of a nation, as in ancient Greece, supply and demand going hand in hand under the influence of keen, enlightened interest and criticism, making art a national pride; and (2) when art has its cause and encouragement in the feeling for art possessed by the cultured few who have the power to bestow upon it an enlightened patronage. This was the case mostly among the ecclesiastics and nobles of the Middle Ages, though the nation gained largely in all time through the same.

But modern art in England has existed chiefly under the condition of the artist coming into the market with his wares, as at Exhibitions, &c., and thus becoming necessarily subject to ignorant popular approval or indifference, and the possibly misdirected patronage of the rich, of Government, corporations, &c. Under these conditions, the surprise is that so many works of the highest excellence have been produced, too often, alas! uncommissioned; but proving that in native capacity the English are in nowise behind their neighbours, past or present, in artistic gifts; and while so little opportunity or encouragement for their display has existed, perhaps no other *one* nation could show—say, from the time of Flaxman,—works of greater

interest and merit than those which have appeared among the English school, if not altogether in grandeur of composition and consummate anatomy, yet in an unsurpassed purity of feeling, loveliness of expression, and genuine originality. A long list could be made of such works, which, had they been dug up from the soil of Greece or Rome, would have elicited raptures, and won all the praises of critics and connoisseurs, now either denied to real genius, or bestowed on its opposite. Such works as Bailey's "Eve," McDowell's "Eve," Foley's "Mother" and "Ino and Bacchus," Bell's "Dorothea," Munroe's Child sculpture, with countless other instances at once rush to the mind. Give to English art, in whatever department, a true, generous development in its culture, guidance, and patronage, and we have no reason to think that we are at all behind in artistic faculty, but the very reverse. It is, however, true that save in the native love for and encouragement of landscape art, England has been peculiarly unfortunate; and the greatest genius in historical and ideal art, whether painting or sculpture, as also in architecture, has been wasted among us under the chilling influence above noted. J. H. B.

SCHOOL BOARDS.

London.—The works committee invited tenders from builders for the erection of a school to provide accommodation for 580 children, on the site in Cook's-ground, Chelsea. The tenders appeared in our list of the 18th inst. The committee recommended the acceptance of the lowest tender, that of Mr. W. Wigmore, amounting to 5,100*l.* The committee also invited tenders for the erection of a school to provide accommodation for 1,186 children, on the site in Maidstone-street, Haggerton. These tenders also appeared in our list of last week. The committee recommended the acceptance of the lowest tender, that of Messrs. W. H. & J. Mansbridge, amounting to 7,193*l.* Tenders have also been invited from builders for the erection of a school to provide accommodation for 720 children, on the site in Russell and Riley streets, Southwark. The amounts were as follow:—A. Sheffield, 6,236*l.*; Benjamin Wells, 6,200*l.*; Joseph Cook, 5,797*l.*; Manley & Rogers, 5,767*l.*; Scrivener & White, 5,764*l.*; Marsland & Sons, 5,740*l.*; W. Shepherd, 5,675*l.*; Wicks, Bangs, & Co., 5,595*l.*; S. J. Jerrard, 5,586*l.*; Cooke & Green, 5,575*l.*; Dove, Brothers, 5,475*l.*; J. & F. Coleman, 5,445*l.*; W. Higgs, 5,405*l.*; W. Howard, 5,280*l.* The committee recommended the acceptance of the lowest tender, that of Mr. W. Howard, amounting to 5,280*l.* The recommendations were agreed to; as also the tender of Mr. J. Spink, of Grove-road, Clapham Junction, amounting to 5,370*l.*, for the erection of a school to provide accommodation for 575 children, on the site of Bolingbroke-road, Battersea; and also the tender of Mr. G. Stephenson, of Beaufort-street, Chelsea, amounting to 5,901*l.*, for the building of a school to accommodate 824 children, on the site in Winstanley-road, Lambeth.

Huddersfield.—A letter was read from the Education Department agreeing to the erection of a school in Almondbury for 412 children. Tenders were sent in for the erection of the Lindley Oakes School, and the following were decided upon:—Masons, Dyson, Bros., Lindley; joiner, James Christie, Huddersfield; ironmonger, James Brook; slaters, Pycock & Sons, Leeds; plumbers, J. H. Taylor & Co., Huddersfield; plasterers, Longbottom & Son; painter, W. T. Earnshaw, Lindley; ventilation, Lawson & Hainsworth; clock and bell, Mr. J. W. Bell, at a total cost of 7,885*l.* 14*s.*

Stoke-upon-Trent.—Mr. Grose brought forward a series of motions relating to new schools at Kingscroft and Stoke. At Kingscroft Mr. Grose proposed to build a school in two departments for 200 children, as near as possible to the present schoolroom. The second school, Mr. Grose suggested, should be built in the centre of the town. Mr. Grose would build a school of three departments, viz., 180 boys, 180 girls, and 200 infants. Mr. Bishop hoped the Board would hesitate before committing themselves to a serious expense without ample proof that such schoolrooms were absolutely necessary. Considerable room was still to be found in the rector's schools in Stoke. A long conversation followed, but eventually Mr. Grose withdrew his motion, and a committee was appointed to draw up a report on the subject.

Carlisle.—Mr. Wrigley renewed the motion which he had made at the last meeting, that Mr. Birkett be appointed architect of the new Board schools. He moved his appointment on the understanding that he allow the plans to undergo such modifications as shall meet the wishes of the Board. Mr. Hannah seconded the motion, but he was not very well satisfied with any of the plans. His opinion as a practical teacher was that the schools would be all too narrow. The Government had commenced with 16 ft. as the width of their schools, then they got to 18 ft., and though that was still their standard, he believed they were ready to accept 20 ft. Mr. Birkett's would be 20 ft., but they ought not to be less than 25 ft. This opinion was borne out by other School Boards. The Halifax Board had adopted plans of a school 25 ft. wide; the Government considered the width too great, and refused to sanction them, and the Board sent the plans back, asking their lordships to reconsider the decision, and there they were at present. All the plans were L shaped, too, and he had heard that that was inconvenient. In the infant school he could not see the use of three class-rooms, and if the main room was enlarged from 26 ft. to 28 ft., and two of the class-rooms done away with, it would do. The lighting and many other things would have to be altered. Canon Prescott objected to the plans mainly because the houses and water-closets were away from the schools altogether, and that of the infants further than any of the others. Mr. Wrigley pointed out that there was a covered way to the infants' closets. A long discussion ensued, and at length the motion was put and agreed to.

THE CHAIR OF FINE ART AT CAMBRIDGE.

ON the supposition that Sir Digby Wyatt will not seek to retain the Slade Professorship at Cambridge, Mr. W. Cave Thomas has offered himself, amongst others, for the appointment. Mr. Thomas says in his address,—

"It is very commonly but erroneously supposed, that the principles of Art must be evolved by some different method than the laws of physical phenomena; that they are in fact inscrutable, shadowy, and free from any hard and fast rule. This is most unfortunate for Art progress. The true principles of Art may be obtained by a strictly inductive method, by careful observation and experiment, by a method as strict indeed as that pursued in the study of any other class of phenomena; the difference merely being, that in the one case we observe and test external phenomena, whilst in the other we have to observe and test the phenomena of our own inner sentient being. Every great work of art is the result of induction, the fruition of careful observation and experiment, from which the painter or sculptor has learnt to eliminate what is variable, what is abnormal, and to present the spectator with those more general, central, or immutable truths of the two worlds of external and human nature of which he must equally be the student."

Mr. Cave Thomas, by a long course of thoughtful study, has well fitted himself for the position he seeks, and shows this by his works both as a painter and a writer.

DILAPIDATION CASE.

COOK *v.* MAGGS.

THIS action, brought in Westminster County Court to recover the sum of 30*l.*, opened up some questions respecting dilapidation of buildings.

Mr. Cook, barrister, on behalf of the plaintiff, a gentleman residing at 18, Warwick-square, Pimlico, produced the agreement made between the litigants for the tenancy of a house in Myrtle-street, Dalston, and by which the defendant was bound, at the expiration of his lease, to repair the premises and leave them in the same condition as when he entered into possession.

Mr. Brabey, builder, said previous to the defendant taking possession of the premises he put them in thorough repair, and his bill was about 50*l.* for the work he did.

Mr. Bellinger, builder, said he had repaired the premises since the defendant left, and his bill amounted to 22*l.* The roof of the house was in a bad state, and the interior required repainting and new papering.

Cross-examined: Much of the damage to the place arose from the damp; but he could not separate that portion of the repairs from the others. He repaired the house in July last.

Mr. Hall, foreman to Mr. Bellinger, estimated the damage arising from the damp at 10*l.*

The learned Judge said according to this evidence the plaintiff had made no case for repairs, or dilapidations.

Mr. Bellinger here said his estimate for doing the necessary repairs was 22*l.*; but as he wished for the job he did it for 15*l.*

Mr. Witterfield, barrister, contended that the plaintiff was not entitled to any damages for repairing the house. His client vacated it in March, and it was not until July any one from the landlord entered to put the premises in order. During those four months the rain had reached the inside, and not being looked after, this had caused the damage spoken to, and now the landlord wanted to attribute the injury to the tenant who actually had at the time of his quitting paid a builder to repair the house according to the agreement alluded to.

With respect to that part of the claim for rent owing, the defendant had a complete set off, for the landlord still retained 10*l.*, which was given by the tenant as a deposit, when the agreement was signed, and the defendant had further paid 16*s.* for property-tax, which the landlord was bound to recoup by law.

A number of builders on behalf of the tenant were called, and they each stated that if the premises were left four months unoccupied, or unseen to, the damp would get in and injure the paper-hangings, ceilings, paint, and floor. It was also proved that when the defendant left, he had it repaired at an expense of 3*l.* 4*s.* by a competent builder.

The defendant's housekeeper stated that before her master left, the landlord's agent called and pointed out what was necessary to be done, and this was carried out.

The learned Judge said he did not remember so weak a case with regard to claims for dilapidation. There was no evidence to show the state of the house when the defendant gave up possession, and the premises could not have been in the same state four months afterwards after being exposed to the rain, and no one to look after them. It was like a house in Chancery. No evidence by receipt had been produced to show that the plaintiff had paid any sum as stated for repairs, and altogether the case was so weak, that he should only give a nominal verdict for the plaintiff, and assess the damages at one shilling for dilapidations.

As to the claim for rent, the set-off had been clearly proved by the receipts, and on that head his judgment would be for the defendant.

"I KNOW A HAWK FROM A HANDSAW."

SIR,—Will you kindly permit me a word of explanation in reference to the letter of "A. H." in your publication of January 18th. As it stands, it would seem to imply that I had borrowed, without acknowledgment, a suggestion made by another writer in another publication, and that I had admitted the fact to "A. H." Such an inference would be entirely contrary to the truth. The theory in question has long been familiar with me. When I wrote the article in *Notes and Queries* I had not seen the *Antiquary*, nor was I aware that such a publication was in existence. "A. H." forwarded to me a copy of the *Antiquary* of a few weeks previously, in which doubtless the same theory was put forth, but treated entirely differently, as any person may judge who will compare the two articles.

It is satisfactory to find that two independent critics should almost simultaneously come to the same conclusions respecting a disputed passage in our great dramatist. Whatever credit may be due to the first publication of it I am quite ready to concede to your correspondent.

J. A. PICTON.

*** We print Mr. Picton's letter; but it is quite unnecessary.

A FOREMAN'S VIEW.

SIR,—Seeing a note in the *Builder* of Jan. 11, 1873, referring to the unfitness of foremen, no doubt there are some muffs in that class, and for my part I do not see where, in a few years, there will be found any men fit to carry on good work if the societies are allowed to have their sway. I speak from twenty-three years' experience in and about London as a foreman and master. As soon as a job is commenced in London, all the societies at once seem to be aware of the minutest particulars as regards the quality of work required, and character of masters and foremen. Of course, there are always the usual loafers at the society: they are sent first, and soon get their discharge, as no good; but they have been long enough to spoil any one intending to do a day's work; also to get every particular, and send more of their class. I say, again, it is with the greatest difficulty that we, as foremen, can get men to do the work, as the muff gets the full pay, and a genuine man gets no more; therefore there is no encouragement to persevere, as (according to society rules) he cannot get more money than the muff who works beside him, so he sinks to the same level for want of encouragement. I have had, say, sixty or seventy men in London at a time on a job, and scarcely a man who really could be trusted for one hour to do his work. They required continually to be looked up and shown the simplest and most trifling thing, and then they would take some roundabout way to do it. All the blame is thrown upon the foreman, who is also time-keeper and clerk, sometimes working man, and also draughtsman, as well as storekeeper, for scarcely any more per hour than the muff who gives him so much trouble, when all the hours are counted (as he must spend many hours after the men are gone to keep his accounts in order).

Now I ask the *Builder* what encouragment is there for a first-class man at 50*s.* per week, when the poorest tool gets 40*s.* per week? A LONDON FOREMAN.

ARCHITECTS' GUARANTEES FOR CONTRACTORS.

IN the Bloomsbury County Court, before Mr. L. Russell, judge, the case of Curtis *v.* Solomon afforded some hints to architects and surveyors incautiously becoming responsible for building materials.

Mr. Curtis, a zinc and metal worker, brought his action against Mr. Solomon, an architect and surveyor of Southampton-street, Holborn, to recover the sum of 16*l.* 13*s.* 9*d.* balance of work done by a contractor named James, under the following circumstances.

Mr. Curtis stated that, in the beginning of August last, a builder named James applied to him for an estimate for the zinc work required for two houses in the New-cut, Lambeth; and having gone over the matter, he was unable to give any distinct figure, and no special price was agreed upon; and Mr. James, being unknown to him, he told him, before he commenced the job, that he should require some solvent person to become answerable for the payment for the work done; and Mr. Solomon, on being applied to, agreed to become answerable.

He did all the work required, and Mr. James paid him one cheque and Mr. Solomon another, as the work went

on, still leaving the balance now sued for. Mr. James, not being in a position, and refusing, to pay the remainder of the account, he had no alternative but to fall back on the defendant, and for whom the work had been executed to his satisfaction.

In cross-examination by Mr. Lewis, the witness admitted a letter produced to be his handwriting. This letter was addressed to Mr. Solomon, and one part recited, "Mr. James, of Newman-street, has appointed me to do certain zincwork for two houses in the New-cut, Lambeth, and has referred me to you for payment." He received a cheque of the defendant's for twenty-five pounds, after that letter was sent.

The answer to the case was, that James had a large contract with the defendant, and that all the guarantee given by Mr. Solomon was, promising Mr. Curtis to do all he could to see James paid him for the work done, and with this view, instead of giving James a cheque for twenty-five pounds to pay Mr. Curtis, Mr. Solomon sent the money direct to the plaintiff.

Mr. Solomon positively denied giving the plaintiff any guarantee for payment, or saying he would be liable; and Mr. Curtis's own letter showed this by saying, "he was referred to him for payment."

The learned Judge observed that there was a considerable conflict of evidence between the parties, and there was no written guarantee produced, or indeed any reliable parole promise to pay, and in the face of the plaintiff's own letter, he could not do otherwise than find for the defendant.

Verdict for the defendant accordingly, with costs.

WARMING.

SIR,—I observe a letter in your last number signed "Reader," asking if "Lewis's Patent Warm Air-Chamber Fireplaces," which I described in your paper of February 18, 1871, as having used in my residence, continue to answer my expectations.

In reply, I beg to say that they answer splendidly in my house and others where I have used them.

The other day I received a commission to build a house, through a gentleman, a stranger to me, having "been struck with the economical way I had warmed a house" in which I used them. I have advised Mr. Lewis to send his address to your advertising columns, so that "Reader" and others may find him out. F.R.I.B.A.

SCAFFOLD HIRING.

IN the Clerkenwell County Court last week, Mr. Terrey, builder, of Bowling-green-lane, sued Mr. Leggatt, house decorator, of 15, Little George-street, Portman-square, for the hire of scaffolding and trestles, and the sum claimed was 6*l*. 10s.

Mr. Terrey stated in March, 1871, Mr. Leggatt was painting the Roman Catholic Chapel, in Rosomond-street, and hired two trestles, boards, &c., for which he agreed to pay 1s. 6d. per day. A deposit of a sovereign was made, and the goods had not yet been returned. The original value was 10*l*., and he estimated their worth now at 7*l*. 10s., and deducting the 1*l*. paid left the sum now claimed.

Upon cross-examination by the defendant, the plaintiff stated there was no specific arrangement as to the term of hiring of the goods, or if they were returned in ten days half the deposit was to be returned. He did not agree to fetch them away from the job, but expected them to be brought back by the hirer, which was the custom of the trade.

In answer to the claim, Mr. Leggatt said he agreed with Mr. Terrey for the use of the things for ten days, and the job for which they were required was finished in eight days. The understanding was, that Mr. Terrey was to fetch the trestles, &c., away, but as he did not send for them after remaining at the job for some time, they were sent to witness's place of business, where they were now; but he had not made use of them since. He refused to give them up unless half the deposit was returned. The whole lot were not worth more than 5*l*., having been strengthened by iron plates.

Mr. Terrey said the trestles were perfectly sound when he let Mr. Leggatt have them, and he paid about 9*l*. 10s. for them second-hand.

The Judge said the plaintiff had sued both for hire and value. He could not fire two guns at once, and he must nonsuit him.

The plaintiff did not appear to understand the reason of not being able to recover both ways; but the decision does not prevent him suing either for hire or value at a future time.

ART AND DESIGN.

SIR,—As this subject has attracted much attention of late through Sir Arthur Helps's observations thereon at Portsmouth in these words, "Let us get rid of inaccuracy," &c., it should also be shown in the press, through your kindness, that inaccuracy commences in our schools of art by pupils not holding the pencil aright, as seen in the Bathforum school of art, where some sixty boys were instructed, and only one or two held the pencil right according to a surgeon holding the dissecting-knife, as an example of the scientific mode of holding pencil and pen. Other inaccuracies exist in the patterns of nothing for pupils to copy, whereas nature is full of examples that are worthy of notice, such as are represented in drawings from nature from the microscope by Leeuwenhock, wherein the first lessons in drawing in parallel, horizontal, and perpendicular lines are available, besides in patterns for artistic work. Furthermore, the performances of celebrated artists in our weekly periodicals and other works show sad falling away from Hogarth's criticism of art and design. The question now is, should science and nature be neglected in preference to men's crude notions of the present day? Again, the drill is introduced into schools; wherefore should pupils be suffered to lounge and appear careless of their work, whilst elegance and gracefulness of the person, and freedom of the thumb, fingers, and wrist, would add to the well being of every pupil? Again, teachers of drawing expect their pupils to draw straight lines, which they cannot draw themselves, and which do not exist in nature.

With these preliminaries, is it too much to suggest a discussion of the subject in private and public meetings to consider before we commit further inroads in inefficiencies, whilst some ten or more objects from nature are ready for examination to supersede present plans?

Let us get rid of rubbish, instead of cherishing "oily talk" from the Privy Council amidst the national disgrace in artistic drawing.

WILLIAM PARKER, M.R.C.S.

PRESENTATION TO AN ARCHITECT.

LET us note a novelty. Last week Mr. Alex. Reid, architect, Elgin, met a large number of his business friends, by invitation, in the Assembly Rooms, Elgin, where, at an entertainment they presented him with a very handsome marriage gift—plate and other articles, to the value of 180*l*., including a gold necklet and locket for the lady of his choice, as a mark of their respect, and of their appreciation of his professional abilities. Major Johnston, Newmill, presided, and made the presentation in a happy speech, proposing, at the same time, the health of Mr. Reid, and wishing that the interesting event, in view of which they had met that evening, might bring to him every possible happiness. The toast was received with enthusiasm, and Mr. Reid tastefully acknowledged the toast and the presents.

THE STREETS OF DUBLIN.

SIR,—I have been informed that a well-known and well-informed member of the corporation has unexpectedly turned upon that august body, and administered a rebuke, the severity of which can be well estimated by those who know him as an accurate and conscientious observer. The gentleman referred to is reported to have publicly said that the streets of Dublin were kept constantly clean and in a state of thorough repair. . . . . I doubt that Socrates himself ever used more scathing irony against the sophists than did the energetic member of the corporation of this city when he spoke those ever-to-be-remembered words; and I trust that my down-trodden and over-taxed fellow-citizens will with me take heart, now that we have so potent an advocate of those rights for which we pay so heavily, but have not. DUBLINIENSIS.

BARROW-IN-FURNESS.

THE mayor, aldermen, and burgesses of the young and vigorous borough of Barrow-in-Furness have a Bill before Parliament, that has passed Standing Orders this week, in which they ask for Parliamentary powers to accomplish various important objects. These include powers to make additional waterworks and gasworks, and new streets; for extending the limits within which they may supply gas and water; for making a railway or tramway; and for other purposes. The estimated expense of the waterworks is 28,000*l*.; of the two new streets, 33,000*l*.; and of the railway, 1,460*l*. The corporation also ask for powers by the Bill to erect and maintain, at such time as may seem fit, a town-hall and public buildings, at a cost of 25,000*l*.

STEEPLE-JACK ON DARLINGTON CHURCH SPIRE.

DURING the heavy gales last November, the iron rod on which the weather-cock of this church was placed gave way, and its vane is now being restored by Messrs. Sanderson & Proctor, of Huddersfield. In order to reach the top of the church spire, instead of scaffolding, only a few iron spikes were driven into the joints of the stone work at intervals, the workman being slung in a kind of saddle, which was removed higher up as every fresh spike was driven in. A rope with blocks and pulleys was at length securely fastened round the highest part of the spire, and by that means the men ascended and descended in a remarkably simple though danger-ous manner. By this means the iron rod, which has been hanging from the top of the spire by the most slender hold, was brought down. It had broken off close by the top of the ball of lead which forms the cap of the steeple, the corrosion being caused by the galvanic action of the two metals, iron and lead. To avoid corrosion in the future, it is proposed to put a cast-iron cap in place of the lead one; and a new iron rod, of a similar design to the old one, with a cross, is being forged by Mr. Jos. Wray, of the Bridge-end. The old weathercock, which is of copper, has been re-gilded by Mr. John Willis, and it was expected that in about a week the whole work would be completed.

MEETING OF DELEGATES OF SANITARY AUTHORITIES AT SHREWSBURY.

ON Friday in last week a meeting of delegates from the various sanitary authorities of Shropshire and some portions of the adjacent counties was held in the Shire-hall at Shrewsbury, to consider the appointment of a medical officer under the Public Health Act of 1872. The chairman reported that the following unions assented generally to the joint appointment of a medical officer of health, namely,—Atcham, Church Stretton, Clun, Ludlow, Forden, Shifnal, Madeley, Bridgnorth, and Cleobury Mortimer; and that Newport and Tenbury would probably join. It was resolved that one medical officer of health be appointed for all the assenting unions; that the appointment be made, in the first instance, for two years; that the salary be 800*l*. per annum, to include travelling and all other expenses, and that the medical officer devote his whole time to the duties of his office. It was further agreed, "That the testimonials be examined, and the appointment made, by three delegates from each sanitary authority." The chairman, Captain Severne, and Mr. Corbett, were requested to advertise for candidates, and to arrange the other preliminaries for the election of the medical officer of health.

VARIORUM.

"A FEW Thoughts on Sanitary Questions, by T. W. Wallis," Sanitary Engineer (Larder, Louth), interest us mainly because they are the work of one who some years ago made himself worthily known by the production of some admirable carvings of dead game, for which medals were justly awarded him. Mr. Wallis has changed his profession, and we are sorry for it. The letters here put together doubtless woke up some of the good people of Louth and its neighbourhood, and will do good elsewhere. Nevertheless, we regret his loss in the practice of an art the difficulties of which he had mastered.——A second edition has been published by Messrs. Stevens & Haynes, of "The Rule of the Law of Fixtures," by Archibald Brown, Barrister-at-Law (Bell-yard, Temple Bar, 1872). Its distinctive feature is that it includes a statement of the principal American decisions. Some recent Scotch and Irish cases are also added.——The Council of the Society of Arts have issued in a separate form (Bell & Daldy, York-street), some Reports on the London International Exhibition, 1872, prepared under their direction. As the Council "desire it to be understood that, in publishing these reports, they do not necessarily adopt all the views expressed in them, which must be taken as those of the writers only," the writers' names should have been given.——"Notes on the Elements of Algebra and Trigonometry," by William N. Griffin, B.D. (Longmans, Green, & Co.), includes solutions of the more difficult questions. The student who uses the book in lieu of a master must not turn too soon to this part of it. "Mathematical proficiency results, not from inspecting the solutions of a number of examples, but from the hours of patient thought spent in drawing from them the power of solving other similar examples which may arise."——The new number of the *Quarterly* includes an article on "The Exhaustion of the Soil of Great Britain," which should interest many of our readers.——The *Mechanics' Magazine*, after a career of half a century (being the oldest technical periodical in existence), will henceforth appear in an enlarged and improved form under the title of *Iron*, which sufficiently indicates the more comprehensive programme of the new series as a reflex of everything affecting this important interest and all its ramifications.——"Nations,

Languages, and Tongues." Messrs. Hall & Co., of Paternoster-row, announce, under this title, the publication of a Rudimentary Dictionary of Universal Philology.

Miscellanea.

Decoration of the Mansion-house, London.—The two state drawing-rooms have been painted, gilt, and enriched. The ground of the centre of the ceiling is white, the panels and borders, as well as the surrounding cornices, being etched in gold; the coved portion beyond, extending to the walls, is of a light cream colour, and embellished with elaborate gilding. The *City Press* gives a fuller description:—The walls are painted in parti-colour, a delicate Wedgwood blue predominating, and the large panels are covered with richly-figured amber satin, surrounded by massive gilt mouldings. Both apartments have also been fitted with large dogstone fire ranges, with marble fenders, polished steel bars, and encaustic tile hearths. The Venetian Parlour has been embellished. The centre of the ceiling, like the state drawing-rooms, is white and gold, the enrichment of the panelling being exceedingly artistic. The festoons of fruit and flowers around the cove of the ceiling have also been tastefully ornamented and gilt, while the enrichments and gilding of the bold cornice immediately beneath are a striking feature in the decorations. The painting of the walls consists of a buff ground, the columns and pilasters, together with the panels containing the large mirrors around the apartment, being gilt and ornamented, as well as the framework and mouldings around the large circular window overlooking Queen Victoria-street. The decorations of the Long Parlour (approached from the saloon and vestibule) are among the principal features in the ornamentation of the interior. As regards the ceiling, noted for its elaborate mouldings, and their extreme heaviness, a change has been effected. All the flat portion of the ceiling is in white and gold, while the upright portion is in a light tint, the soffits and the styles being in Wedgwood blue, and the whole enriched by massive gilding. That portion of the walls between the skirting and the surbase is in panels painted in varied rich colours.

The Kendal Sewage Scheme.—Mr. Blackburn, of Aldershott, accompanied by the Mayor and the Borough Surveyor, have made an inspection of the Kendal Corporation land at Wattsfield, with the view generally of advising the Council upon its adaptability for utilising the sewage of the town, and also what in other respects would be the best plan for disposing of the sewage of Kendal. His report will, we understand, be unfavourable to irrigating the greater portion of the recently-purchased Wattsfield Estate, with sewage, on account of the great cost which pumping up the sewage would entail and its comparatively worthless nature when pumped. Mr. Blackburn is of opinion that sufficient land can be obtained below the present farm, which can be irrigated by gravitation. He is decidedly adverse to corporate bodies engaging in sewage farming. A difficulty that has struck him in the way of utilising the Kendal sewage is the unusual quantity of surface and spring water that finds its way into the drains.

Extraordinary Proceedings at the Iron Church, Prodsham. — One morning lately, about two (a.m.), a number of men were found busy, under the direction of the vicar, erecting a wooden addition to the iron church, projecting from one side, and some 9 ft. square, whilst one or two others were endeavouring to demolish part of the work as fast as it was being proceeded with; but, as the vicar's force was much the strongest, and being well supplied with beer and pies, the other party had to give way. Between ten and eleven o'clock the same morning, however, some fresh actors, with axes, saws, files, chisels, &c., commenced, in a very summary way, to reduce the dimensions of the new erection by cutting about 2 ft. off the outer side, and, as there was no opposing force present, this part of the drama was soon accomplished. It seems there is a dispute between the vicar and the owner of the land adjoining as to the exact boundary of the site of the church, the owner of that land contending that it was an encroachment to the extent of the piece cut off.

Patent Gas-burners.—At a recent *conversazione* of the Birmingham and Midland Institute, Messrs. John Wright & Co. exhibited a series of models of Wallace's patent gas-burners, which are said to have solved the problem of burning a mixture of air and gas with certainty and safety under all conditions of pressure or quality of gas. The lower part of the flame contains a conical space whose surface is of a brilliant emerald green colour; and this is surmounted by a clear amber flame. The temperature of this flame is such that, coming from a half-inch Bunsen burner tube at main pressure, it will, it is said, readily melt brass, silver, gold, or copper. The experiment was made frequently during the evening with copper, the drops of molten metal falling into a glass vessel of water. The temperature of the flame is estimated at about 3,000° Fahrenheit. The size of the burners ranged from the common laboratory burner, consuming 3 ft. per hour, to the steam-boiler furnace, which would burn 80 ft. per hour. Such a burner would need good ventilation.

Fatal Accident. — In St. Bride-street, opposite Harp-alley, Farringdon-street, a stone outlet is being constructed by Messrs. Noel & Robson, contractors for the Metropolitan Board of Works, to carry off the overflow water from St. Pancras, where the storm floods from the Highgate hills are intercepted at Wharf-road, and so directed from the Fleet sewer and emptied into the Thames at Blackfriars Bridge. A wooden platform had been erected about 12 ft. above the level of the railway, and upon this was deposited the wet clay raised through shafts some 50 ft. in depth, and which was constantly being carted away. As Samuel Burton, a bricklayers' labourer, and Samuel Thompson, a miner, were passing under the heavily-weighted platform, the timbers suddenly gave way, and both men were buried under the falling mass of wet clay. Thompson was speedily rescued, and conveyed to St. Bartholomew's Hospital; but when Burton was dug out he was quite dead. Thompson has received such injuries as to make his recovery doubtful.

An Aquarium for Scarborough. — A report, to the town council, of a committee, on a letter from Mr. J. McMillan, proposing to erect a large public aquarium at Scarborough similar to that at Brighton, has been considered by the council. The plans were prepared by Mr. T. Birch, C.E. The committee recommended that the council grant to the promoters for 999 years, the land applied for, at an annual rent of 200*l*. The cost of the construction would be from 30,000*l*. to 40,000*l*. After a long discussion, however, a resolution was passed to the effect that while the council approved of the scheme, the consideration of the terms and conditions should be referred back to the committee.

Grainers and Marblers.—A large meeting, composed of London imitators of woods and marbles, was held on Friday evening, January 17, at the Earl Cathcart Tavern, Munster-square, Regent's Park, to take into consideration the formation of a trade-union, and to discuss various matters connected with their interests. The chair was taken by Mr. Kensit, and supported by Mr. Dickson. The objects of the society were explained by Mr. Jas. M'Intosh in a very able manner, and many useful suggestions were then made and discussed by the several persons. A committee was formed to draw up rules for the guidance of its future members, and, after passing a vote of thanks to the chairman, the meeting separated.

Messrs. Longman's Scientific and Educational Works.—We may do good by directing attention to the remarkable series of educational and scientific books advertised by Messrs. Longmans, Green, & Co., in the present and a previous number of our journal. Their stock of such works must be enormous, and all engaged in teaching or anxious to learn may find in it proper instruments for their purpose. From the list advertised in our present number we would select Ure's "Dictionary of Arts, Manufactures, and Commerce," Brande's "Dictionary of Science, Literature, and Art," and Gwilt's "Encyclopædia of Architecture," as three of the most useful works we know.

Institution of Surveyors.—At the next meeting, to be held on Monday evening, January 27th, the discussion on the Paper by Mr. W. Sturge, entitled "Statistical Notes on the Prices of Agricultural Produce, Labour, and Rent, from the Early Part of the Last Century to the Present Time," will be resumed.

The Wigan Infirmary Exhibition.—At a special meeting of the Wigan town council, a resolution has been unanimously passed, complying with the request of the Wigan Infirmary Exhibition and Bazaar Committee, that the corporation should authorise the mayor to invite the Queen, or such other member of the Royal Family as her Majesty should be pleased to appoint to represent her on the occasion of the opening of the institution. The infirmary has been erected at a cost of nearly 30,000*l*., the whole of which has been raised by public subscription; and the Exhibition and Fancy Fair are intended to raise 5,000*l*. for necessary furnishing, endowment, &c. The district of the institution includes nearly all the mining and manufacturing district of South Lancashire.

London International Exhibition, 1873. The fourth meeting of the committee on cooking was held on Saturday last, at the offices, Gore Lodge, South Kensington. The committee considered certain proposals with reference to a practical and instructive illustration of popular cooking, as adapted to the requirements of the middle and lower classes, and they inspected sites in the Exhibition buildings which appeared suitable for the purpose. After having passed resolutions containing recommendations to her Majesty's Commissioners as to the best executive arrangements for the class, the committee adjourned until Monday, the 27th inst. Much good might be done by this committee.

Ipswich Mechanics' Institution: Portrait of Mr. Thomas Shave Gowing.—A number of friends, recognising Mr. Gowing's long and invaluable services to the Ipswich Mechanics' Institution, determined to have his portrait painted and to present it to that institution. Mr. W. R. Symonds, of Ipswich, was intrusted with the commission, and the portrait is now on view in the library of the Townhall. The young artist, says a local paper, has caught Mr. Gowing's expression just at the time he has set the mechanics' committee in a roar with a pun or epigram. Round the room are hung several paintings by local artists.

Cleveland Institute of Engineers, Middlesbrough. — The monthly meeting of this Institute has been held at Middlesbrough; Mr. Jeremiah Head, president, in the chair. A paper was read by Mr. John Dunning, C.E., on his proposed plan for converting the river Tees into a dock. The chairman, in commenting on the plan, expressed the opinion that it was a very practical one, and that the real difficulties in the way would not be of an engineering nature, but would lie in legal opposition and preconceived notions. An interesting discussion ensued.

Camberwell.—The old mansion situated at the foot of Denmark-hill, Camberwell, which was erected by Sir Christopher Wren upwards of 200 years ago, has been disposed of by auction, as materials, in upwards of 100 lots, and will now at once be demolished, in order to make way for the erection of about 200 houses, which are about to be built on the site and the grounds connected with the mansion, which are about to be laid out in streets. The mansion is identified with Mrs. Thrale and the family who founded the great firm of Barclay, Perkins, & Co., when Dr. Johnson was a frequent visitor there.

Grimsby Docks.—Sir E. Watkin and several of the directors of the Manchester, Sheffield, and Lincolnshire Railway Company, together with Mr. R. G. Underdown, the general manager, and Mr. C. Sacré, engineer, have visited Grimsby, for the purpose of ascertaining by personal inspection the additional facilities required to meet the necessities of the greatly increasing timber trade on the west side, and the general export and import trade on the east side. It is probable that a road at the rear of the timber yards will be taken in and added to the timber ground.

Ancient Architectural Remains in Salisbury.—Remarkable antiquarian discoveries are being made in Salisbury. The massive foundations of the south-east corner of the old monastery are laid bare. The hardness and compactness of the concrete are referred to as showing how well our ancestors understood the art of building; but this hardness of the concrete partly at least depends on its age.

Fine Arts, Oxford.—Mr. John Ruskin has been re-elected to the office of Slade Professor of Fine Arts, in Oxford, without opposition.

Sewerage of Neston and Parkgate.—At the last meeting of the Local Board at Neston, instructions were given to Messrs. Reade & Goodison, civil engineers, of Liverpool, to prepare the necessary plans and sections for the complete sewerage of the district. The water-supply being now completed, a system of sewerage has become indispensable. The question of utilisation is still an open one, but as the nature of the district is adapted to irrigation works, they may probably be eventually adopted.

Ruislip, Middlesex.—This fine old church, which some years ago was restored to a considerable extent by Sir Gilbert Scott, has had a handsome reredos put up across the chancel, and some other works latterly carried out from the designs of Mr. R. L. Roumieu. It has also been warmed by hot water by Messrs. Bacon's patent. Messrs. Hebbins & Tasler, of Kingston, were the masons; and Mr. Cox the builder. The whole of these works have been done at the expense of one of the churchwardens, Mr. R. Parnell.

Winchester New Guildhall.—It is reported locally that in consequence of the extreme wet weather, and the existence already of a slight bulge in the western wall of the large hall (which, however, has not increased for some weeks), the propriety of buttressing the wall has been canvassed in committee. The four statues of Egbert, Alfred the Great, Henry III. (of Winchester), and Florence de Lunn, the first mayor, are placed in position in the front.

Patent Pipes and Boilers.—Mr. T. S. Truss, C.E., has patented a joint for piping which can be applied by any unskilled person. It consists of an india-rubber band, which passes over the ends of both of the pieces to be joined, and which is retained in its place by the application of a circular iron band. This band is divided into three portions, and these are tightened into their places by nuts and screws.

The Rating of Metalliferous Mines.—At Truro, on the 21st inst., a large meeting, which was attended by Mr. Pendarves Vivian, M.P., Mr. Brydges Willyams, M.P., and Mr. St. Aubyn, M.P., was held to consider the subject of the rating of metalliferous mines. A committee was appointed to draft a Bill in which the principle of the rating of lord's dues was unanimously affirmed.

Cannon-street and Ludgate-hill Footbridges.—The Court of Common Council have referred to the Bridge House Committee to ascertain upon what terms and conditions Cannon-street footbridge can be thrown open to the public, and to report thereon to the court; also to inquire and report why the footway at Ludgate-hill had not hitherto been thrown open to the public.

Demolition of a Factory Chimney.—Last week a square chimney-stalk, 144 ft. high, on the site of the Church-street Mills, Preston, was razed to the ground. The chimney, which was 3 ft. out of the perpendicular, stood in a crowded and busy part of the town. The work of demolition, though both difficult and dangerous, was accomplished without injury to the surrounding property, in the presence of a considerable crowd.

South London Working Men's College.—Professor Huxley, F.R.S., the Principal of the College, will preside at a general meeting on Tuesday evening, January 28th, when a lecture will be given by Mr. J. H. Freeman, F.R.A.S., on "Star Showers." New classes in French, Geography, and History will begin, we hear, in the following week.

The late Mr. M. B. Newton.—We regret to hear of the death of Mr. Marcus Bourne Newton, at his residence, Highbury. He was for many years London agent to Messrs. Joseph Cliff & Son, of Wortley, near Leeds. He was well known in the building trade, as a man of information, and was greatly esteemed by all his friends.

Sculpture, Burlington House.—The added story for the Royal Academy, at Burlington House, will receive the adornment of eight statues. These are, of course, to be executed by members of the Academy.

Burlington Fine Arts Club.—An exhibition of the collected works of the late George Mason, A.R.A., has been opened in the gallery of this club, Savile-row, and will be found interesting.

Dalbeattie Quarries.—Some of our readers may be interested in knowing that Messrs. R. & J. Newall's quarry and his polishing business have been transferred to Messrs. Shearer Smith & Co.

TENDERS

For alterations and additions to house and shop at Sydenham, for Mr. J. Smith. Messrs. Tolley & Dale, architects:—

	Contract No. 1.	Contract No. 2.
Burchell	£579 10 0	£160 0 0
Amer	525 0 0	185 0 0
Hollidge	528 0 0	147 0 0
Thomas	520 0 0*	150 0 0

* Accepted.

For main sewers and other works, Portmadoc. Messrs. Roberts & Morrow, engineers:—

Hughes	£1,630	0	0
Jardine	1,551	17	4
Lewis & Davies (accepted)	1,465	0	0

For house for Mr. J. F. Honey, Stockwell. Mr. A. T. Timewell, architect:—

Snelling	£1,025	0	0
Miller	1,016	0	0
Pharoah	915	0	0
Cobledick (too late)	900	0	0
Harrop (accepted)	855	0	0

For completing two houses, Isleworth-road, Twickenham. Mr. W. C. Banks, architect:—

Farthing	£788	0	0
Vaughan	745	0	0
Story	700	0	0

For the warming of the Memorial Hall, Farringdon-street, to plans prepared by Mr. Hood. Messrs. Tarring & Son, architects:—

Boulting	£793	11	4
Rosser & Russell	670	0	0
Benham & Sons	620	0	0
Gimson	616	0	0
Smith	611	0	0
Rosser & Russell (alternative plan)	577	0	0

None of the above were accepted, but the work was placed in Mr. Hood's hands.

For new Parochial Institution, St. James's, Notting hill. Mr. R. J. Withers, architect:—

Webber	£1,749	0	0
Hockley	1,568	0	0
Dove, Brothers	1,485	0	0
Sharpington & Cole	1,477	0	0
Revised estimate,—			
Sharpington & Cole	1,239	0	0

For new premises in Old-street, St. Lukes's, for Mr. T. Mabe. Mr. H. T. Gordon, architect:—

Moreland	£4,539	0	0
Roon & Barton	4,390	0	0
Newman & Mann	4,150	0	0
Linfield	4,090	0	0
Crabb	4,016	0	0
Ennor	3,904	0	0
Browne & Robinson	3,897	0	0
Sharpington & Cole	3,888	0	0
Thomas	3,795	0	0
Little	3,779	0	0
Woodward	3,775	0	0
Bowman	3,696	0	0
Scrivener & White	3,678	0	0
Merritt & Ashby	3,349	0	0

For the erection of a house on the Anson Estate, in Carlton-road, Tufnell Park, for Mr. J. P. Woulfe. Mr. G. Truefitt, architect:—

Ball (accepted)	£979	0	0

For the completion of the Oval-road Schools and premises, for the Croydon School Board. Mr. C. Heaman, architect. Quantities by Mr. J. S. Perry:—

Jarrett	£3,198	0	0
Bourne	3,153	0	0
Smith	3,055	0	0
Hide	2,946	0	0
Wright, Brothers, & Goodchild	2,915	0	0
Hollidge	2,909	0	0
Peskett & Taylor (accepted)	2,775	0	0

TO CORRESPONDENTS.

T. B.—T. R.—M.—G. C.—R. L.—S. S. P.—M. O. T.—T. N. M.—J. P. P.—J. R.—M. C.—E. H.—O. S.—B. & R.—Dr. M.—A. V.—J. L.—H. F.—R. B.—J. M.—C. & Sons.—P. & T.—G. A.—W. H. R.—L. A. (the papers seem of old da te).—R. L. (in type).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests of course with the authors.

PUBLISHER'S NOTICES.

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CONTRACTS—*continued from p. ii.*

BUILDERS desirous of TENDERING for STABLES, near Weedon, Northants, apply to W. H. FLETCHER, Architect, 8, Blenheim-street, New Bond-street. Two references required from London architects.

PERSONS desirous of TENDERING for the FORMATION of ROADS, on the Ashburnham Park Estate, near the Gipsy Hill Station of the London, Brighton, and South Coast Railway, can see the plans and specifications, and obtain forms of Tender, on application to Mr. HORACE A. ALEXANDER, Architect, 16, King William-street, E.C.

CHRIST CHURCH, MIDDLESEX.—The Churchwardens will meet in their Vestry-room, Spitalfields Church, on TUESDAY, the 11th of FEBRUARY next, at TWELVE o'clock at noon precisely, to receive and open TENDERS for INCLOSING, RAISING, and REPAVING a portion of the Churchyard, Repairing the Wall and Piers in Church-street, Providing and Fixing new Iron Gates, Railing, &c. Plans, specification, and draft contract, may be seen at the Office of Messrs. TOLLEY & DALE, 13, Angel-court, Throgmorton-street, E.C. and at my Office, 5, Princess-street, Spitalfields, where Tenders (sealed and marked "Tender for Gates") will be received prior to the meeting, at which persons Tendering must attend or be represented. The Churchwardens will not be bound to accept the lowest or any Tender.
SUMERSET J. HYAM, Vestry Clerk.
Dated the 20th of January, 1873.

TO ENGINEERS and SURVEYORS.—The Keighley Local Board of Health are desirous of receiving TENDERS for the making of a new SURVEY and FINISHED PLANS of their district to a scale of 20 feet to an inch. The district lies within a circle of one mile radius from the four cross-roads in the centre of the town of Keighley (except where it touches on the parish of Bingley) about 1,800 acres, and is contained in sheets 189 and 200 of the 6-inch Ordnance map. Copies of the specification and forms of Tender, and any further information may be obtained on and after MONDAY, JANUARY 27th, 1873, and sealed Tenders endorsed "Tender for New Survey," must be sent to me before THURSDAY, FEBRUARY 13th, 1873. No allowance for Tenders. The Board do not pledge themselves to accept the lowest or any Tender.
HENRY ALTY, C.E. Engineer to the Local Board.
Keighley, January 15th, 1873.

TO ROADMAKERS and OTHERS.—The Board of Works for the Fulham District hereby give Notice that they will be prepared at their next Meeting, to be held 29th JANUARY, 1873, to receive TENDERS for the CONSTRUCTION of the ROADWAY and PAVING the FOOTPATHS of certain Roads known as Church-road, in the Parish of Hammersmith, Stanley-road, Stanley Park-road, and Grove-road, in the Parish of Fulham. A specification of the intended work may be seen at the Office of the Board, Broadway House, Hammersmith, and further particulars obtained after WEDNESDAY, 22nd instant. Tenders to be addressed to the Chairman of the Board, endorsed "Tender for Making Roads," and "Tender for Paving Footpath," each to be on a separate form, and must be delivered before TEN o'clock on the morning of the day above mentioned.—By order,
THOMAS EDWARD JONES, Clerk.
18th January, 1873.

TO STONE MERCHANTS and OTHERS. The Vestry of the parish of Bermondsey, Surrey, will meet at the Parochial Offices, Russell-street, on MONDAY, the 3rd day of FEBRUARY next, at SIX o'clock in the evening precisely, to receive TENDERS for the SUPPLY of 10,000 feet super. of Second-class ROCKHILL PAVING. The Tenders are to state the price at which the stone will be delivered before the last day of March next, alongside Springall's Wharf, below Bridge, or at the Stone Depôt, Maltby-street. The time named is to be an essential part of the contract, and a fine of 1l. per day will be imposed as liquidated damages for every day which may be exceeded by the contractor in delivering the stone. The measurement of the stone will be ascertained by the Vestry's Surveyor, whose certificate as to quantity and quality shall be binding upon the contractor. The stone will be paid for within a month after the Surveyor has given his certificate of the value of the stone delivered. The Vestry do not bind themselves to accept the lowest or any Tender.—By order,
BENJ. G. WILKINSON, Clerk.
Maltby-street, S.E. January 22, 1873.